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ABSTRACT

This book describes the current state of developments in distance education and distributed learning. The volume brings together some of the leading contemporary contributors in the areas of educational technology and distance education. Topics covered include research and evaluation in distance education, online communities, faculty productivity, online assessment, critical issues and the digital divide, and the hidden curriculum of e-learning. The following chapters are included: (1) "Designing and Studying Learning Experiences that Use Multiple Interactive Media To Bridge Distance and Time" (Chris Dede, Pam Whitehouse, Tara Brown L'Bahy); (2) "A Conceptual Framework for Studying Distance Education" (Charalambos Vrasidas, Gene V. Glass); (3) "Rethinking Assessment for the Online Environment" (Robin Mason); (4) "Learning To Solve Problems Online" (David H. Jonassen); (5) "Is There Anyone There? The Embodiment of Knowledge in Virtual Environments" (Rob Walker); (6) "Revealing the Hidden Curriculum of E-Learning" (Terry Anderson); (7) "Distance Education and the Professorate: The Issue of Productivity" (Thomas C. Reeves); (8) "Evaluation and Research in Distance Education: Implications for Research" (Gary J. Anglin, Gary R. Morrison); (9) "What Makes Online Learning Communities Successful? The Role of Collaborative Learning in Social and Intellectual Development" (Linda Harasim); and (10) "Of Nomads, Polyglots, and Global Villagers: Globalization, Information Technologies, and Critical Education Online" (Michalinos Zembylas, Charalambos Vrasidas, Marina S. McIsaac). Each chapter contains references. (MES)

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Distance Education And Distributed Learning

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A VOLUME IN
CURRENT PERSPECTIVES ON
APPLIED INFORMATION TECHNOLOGIES

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Distance Education and Distributed Learning

A Volume in Current Perspectives
on Applied Information Technologies
Series Editors: Charalambos Vrasidas and Gene V Glass

The Center for the Application of Information Technologies (CAIT) began in 1988 in the College of Education at Western Illinois University as the Satellite Education Network. With a $6.5 million United States Department of Education Star Schools Grant, CAIT's original mission was to provide instructional and inservice resources to Illinois K-12 teachers and students. The Satellite Education Network exists today as a department within CAIT serving nearly 100 Illinois K-12 schools and nearly 1000 nationwide. In July 1996, the Illinois Board of Higher Education formally approved the creation of CAIT in the College of Education and Human Services at Western Illinois University. One of CAIT's major goals is to promote the integration of a broad array of advanced information and communication technologies into education and training settings. In 1998, CAIT received an unprecedented third United States Department of Education five-year Star Schools Grant ($9.8 million). In 2000, CAIT received its fourth Star Schools grant ($10 million). These grants position CAIT and the College of Education and Human Services among the leaders in education and applied information technology.

One of CAIT's objectives is to conduct and disseminate research on the value and efficacy of using information and communication technologies to improve education and training. CAIT researchers have been conducting research and evaluation on several projects developed and implemented by CAIT. The findings of our work were published in books, journals, and presented at national and international conferences. In an attempt to establish another forum for sharing our findings and making contributions to the body of knowledge in the field of educational technology, we announce a series of volumes titled "Current Perspectives on Applied Information Technologies." This series will provide a forum for researchers at CAIT and others around the world to share their knowledge and expertise with the general education community.

For more information about CAIT, visit our website at http://www.cait.org.

Distance Education and Distributed Learning

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CENTER FOR THE APPLICATION OF INFORMATION TECHNOLOGIES

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FOREWORD

It is no accident that the Center for the Application of Information Technologies (CAIT) is located within the College of Education and Human Services at Western Illinois University. From its very beginnings in 1988 to its formal charter by the Illinois Board of Higher Education in 1996, CAIT has focused on the role and impact of teaching and learning with technology. As a part of its mission statement, CAIT was charged with the responsibility not only to develop and model the effective use of information technologies but also to research best practices and explore pertinent issues in the field.

In 2001, in response to the tremendous growth in virtual high schools, CAIT commissioned and published "State of the States: Virtual High Schools." This was the first comprehensive survey of this emerging field, and the response was tremendous. The dialogue that developed as a result of its publication has had an impact on both CAIT and virtual high schools across the United States. This dialogue also drew CAIT more deeply into the field of online education and its impact on higher education around the world. This book series is a direct result of that dialogue, and I believe that it too will have an impact on the field of online learning.

CAIT's role in the development of this book has been that of a catalyst or instigator. At CAIT, we have tried to frame the discussion and issues, but ultimately it is the contributions of each of the authors that make this book such a compelling contribution to the field of online learning. As one of the authors said to me in a discussion, "if nothing else perhaps we can move on to some new issues in the field of online learning instead of just rehashing the same ones over and over." I believe that we have indeed advanced the discussion of online learning and the issues surrounding it with this book.

I would like to thank all of the contributors to this book. This includes the individual authors and the staff at CAIT. However, special recognition and thanks go to Dr. Charalambos Vrasidas and Dr. Gene Glass. Both have spent endless hours and energy working with the authors and the publishers to make this book a reality. We at CAIT are proud to have Dr. Vrasidas on our staff as Assistant Director of Distance Learning and Coordinator of Research and Evaluation and to be associated with Dr. Glass of Arizona State University. Also thanks to Sir John Daniel for his insightful preface.

—Michael Dickson, Director
Center for the Application of Information Technologies
College of Education and Human Services
Western Illinois University

PREFACE

Sir John Daniel
UNESCO

In 1857, Josiah Bumbridge hailed the inventor of the blackboard as one of the greatest benefactors of mankind, adding that the blackboard had created a revolution in education comparable to the introduction of printing with moveable type. During the course of the 20th century, each new communications medium was greeted with similar hyperbole. Radio, film, television, programmed learning, computers, and the Internet were heralded in turn as the basis for an educational revolution comparable to the Gutenberg revolution. At the dawn of the 21st century, as we review educational practice around the world, Bumbridge's statement still has the most evidence to support it. No other educational technology yet comes close to the blackboard in impact or ubiquity.

The task of scholars is to put enthusiastic claims for new technologies into perspective. I welcome this book as an excellent contribution to this work. Providing perspective means observing how students use new media and analysing their activity in the context of what we know about effective learning. The authors of this nicely focused set of papers do this very successfully.

Just as promoters of a new learning medium tend to overstate its importance, so the scholars of specific areas of education tend to exaggerate their distinctiveness. Is distance learning an approach to education that deserves its own conceptual framework, or is it merely a subset of wider

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educational theory? With the growth of hybrid combinations of distance learning and conventional teaching under names like *flexible learning* and *distributed learning,* this becomes an important question. This book addresses it.

The authors break with the futile tradition of comparing the test performances of students using new learning technologies with those who study in more conventional ways. This is a pointless endeavour because any teaching and learning system, old or new, is a complex reality. Comparing the impact of changes to small parts of the system is unlikely to reveal much effect and indeed, "no significant difference" is the usual result of such research. This book rightly examines new learning technologies on their own terms.

Ever since Marshall McLuhan proclaimed that "the medium is the message," we worry that new media may modify the educational message. In this spirit, one contribution to this book examines the hidden curriculum of e-learning. Other chapters look at the nature of interaction in online learning communities and argue the need for using multiple media. Successful distance learning has always been a blend of independent and interactive learning, and it is good to see this principle juxtaposed with the more recent distinction between synchronous and asynchronous media.

The authors take a broad approach. They focus not only on distance learning but also on the wider issues of distance education, such as faculty productivity and the nature of student assessment. In a field that often suffers from uncritical enthusiasm and uni-dimensional analysis, this book is refreshing. It indicates the growing maturity of professional thinking about the integration of newer technologies with the older traditions of teaching and learning at a distance.

INTRODUCTION

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Information technologies used in higher education are transforming the nature of the traditional university. The notion of the university as the knowledge gatekeeper is being questioned by the need to adapt to the changing face of a global economy. Higher education institutions have been criticized for: (a) not being able to accommodate the increasing number of students seeking education, (b) teaching methods used in large lecture halls, typical in universities, are ineffective, and (c) the sense of academic community is disappearing (Daniel, 1996). Commercial developers and providers of educational material are aggressively entering the education marketplace. Higher education institutions need to prepare technologically literate citizens who can solve real-life problems using technology. Daniel (1996) argued that "unless universities become generators of technology-based courses, their faculty will gradually become buyers' guides and librarians for materials produced outside the academy" (p. 138). However, in order for faculty to be able to use technology in their teaching, they need to receive the necessary training and acquire the knowledge and skills needed to be effective in technology-based teaching and learning.

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One of most critical challenges facing higher education institutions is how to develop the capacity for change and remove the barriers built into their cultures that thwart change and maintain the status quo (Duderstadt, 1999). Resistance to change is deeply rooted in our institutions of higher education. One of the major influences preventing the successful integration of technology in education is the education system's resistance to change (Cuban, 1986; Vrasidas & McIsaac, 2001). Resistance is even more obvious when it comes to distance education. The idea of students and teachers being physically separated raises a set of questions that are not asked in traditional education. The fear of relinquishing some of the control and allowing learners to proceed independently is seen as problematic by many educators and policy makers. Distance education is not accorded the same credit, worth, prestige, and legitimacy that traditional face-to-face education receives.

We agree with Burbules and Callister (2000), who argue that dichotomies in our thinking such as "online vs. off-line," "on-campus vs. off-campus," and "face-to-face vs. distance learning" contribute little or nothing to our understanding of education in the modern age.

Technology is blurring the boundaries between these outdated dichotomies, and educators need to rethink their beliefs about learning and teaching. Technology increases the opportunities for interaction among teachers and learners, as well as the interaction of learners with content and technological tools. Furthermore, technology used in education can improve the quality of teaching and learning, provide technology skills for work and life, widen access to education by increasing flexibility, and improve the cost-effectiveness of education (Bates, 2000).

Distance education has changed dramatically over the last 30 years. Technological developments have enabled interaction and collaboration among multiple users on a scale never imagined. As the field of distance education grows and expands, so does the need to re-examine its fundamental assumptions and perspectives. This volume brings together several leading contributors in the field of educational technology, distance education, and distributed learning. Several key issues are addressed: the hidden curriculum in e-learning, faculty productivity and workload, research and evaluation in distance education, theories and paradigms, problem solving online, online community building, distributed learning, and assessment in the online environment.

Chris Dede, **Pam Whitehouse**, and **Tara Brown L'Bahy** in their chapter "Designing and studying learning experiences that use multiple interactive media to bridge distance and time" discuss "distributed learning" as a term used to describe educational experiences that combine the use of face-to-face teaching with synchronous and asynchronous mediated interaction. They analyze the design and educational outcomes of a Harvard Graduate

School of Education course, which served as a prototypical distributed learning experience. Many students who participated in the study reported that the use of asynchronous learning environments positively affected their participation in the course and their individual cognitive processes for engaging with the subject mater. Fewer than half of the students ranked face-to-face interaction as their first choice of learning medium, indicating that the full range of students' learning styles is undercut when interaction is limited to classroom settings rather than distributed across multiple media. The findings of their work have implications for the design of both conventional distance education and traditional classroom instruction.

Charalambos Vrasidas and **Gene V Glass** in their chapter "A conceptual framework for studying distance education" raise serious issues about theory and research in distance education. Their chapter presents a symbolic interactionist conceptual framework for studying distance education and distributed learning environments, discusses findings of research studies from which the framework was generated, and addresses the implications of this framework for the study of distance education. It is argued that theories of distance education, such as the theory of transactional distance, are fundamentally flawed and need to be revisited taking into account the affordances of technologies currently available in distance education and pedagogical approaches based on constructivism, collaborative learning, and learning communities. They conclude that "distance" cannot be the defining characteristic of the field and that scholars must move away from distance—geographical or psychological—and focus their inquiry on those pedagogical interactions mediated by technology and constructed by learners, teachers, and tutors while designing and participating in distance education programs.

Robin Mason in her chapter "Rethinking assessment for the online environment" argues that educators need to rethink assessment practices in light of both the benefits and the problems of learning online. She looks at the fundamentals of assessment that need to be carried over from traditional approaches and then analyses the attributes of the online environment that can be used to rethink the process. She also reviews examples of innovative assessment strategies and identifies a set of principles of good practice in online assessment.

David H. Jonassen in his chapter "Learning to solve problems online" discusses the limitations implicit in online development platforms (e.g., WebCT and Blackboard) and how they constrain the nature of instruction that can be developed and delivered. Jonassen argues that popular platforms do not support alternative forms of knowledge representation nor authentic forms of assessment. Because these platforms try to replicate face-to-face instruction, they rarely support any significant forms of problem solving. He argues that the most authentic form of learning in every-

day life and professional roles is problem solving. He describes different kinds of problem solving that can be supported in online learning and discusses two different approaches to designing online problem-based learning environments.

Rob Walker in his chapter "Is there anyone there? The embodiment of knowledge in virtual environments" argues that the increasing use of computers across a wide range of uses, functions, and purposes raises concerns which are sometimes called "human/machine interface" issues. Such issues include technical design and usability concerns. Often, it is assumed that teaching in distance education is similar to face-to-face teaching. Walker argues that all teaching involves the performance of knowledge and that in distance settings, this gives to teaching a particular character and set of practices. Although most emphasis and discussion are around e-learning, e-teaching also needs to be discussed.

Terry Anderson in his chapter "Revealing the hidden curriculum of e-learning" examines how the hidden curriculum operates in e-learning and whether e-learning conceals a hidden curriculum that is different from campus-based delivery of formal education. The author argues that the hidden curriculum of e-learning has both advantages and disadvantages. The chapter concludes by calling for an evaluation of the strengths, biases, and hidden agendas behind the design and delivery of e-learning. The discussion reveals that e-learning has a unique and valued place in the array of educational systems built to serve the diverse needs of students around the world.

Thomas C. Reeves in his chapter "Distance learning and the professorate: The issue of productivity" argues that faculty productivity is complex and difficult to measure. Most measures of productivity focus on the amount of time faculty members spend per week in various functions such as teaching, research, and service. Current research in distance education provides mixed results when the investment of faculty time is examined, but the balance of the evidence indicates that distance teaching demands more faculty time than traditional classroom teaching. This increased demand creates a tension, especially in institutions where expectations for excellence in both teaching and research are high. Both entrepreneurial and traditional academic institutions are exploring alternative solutions. However, many of these solutions remain uninformed by research. Reeves proposes a developmental research agenda to provide a basis for decision-making regarding the roles of faculty in distance education.

Gary J. Anglin and **Gary R. Morrison** in their chapter "Evaluation and research in distance education: Implications for research" discuss research methods that merit special attention by distance education scholars. They pose questions that need to be addressed using these methods. Finally, they identify potential areas that need to be included in distance education

research programs. These areas include adaptations for learners, instructors, and instructional designers, evaluation (student, course, program), globalization and cultural diversity, access and equity, policy issues, and the impact of technology on the fabric of education.

Linda Harasim in her chapter "What makes online learning communities successful? The role of collaborative learning in social and intellectual development" discusses a conceptual framework, the research methodology, and results of empirical studies conducted to identify effective strategies for online learning. She employs the notion of discourse as central to knowledge building and views learning as a social, negotiated, consensual process. She discusses theoretical and methodological frameworks to help us understand learning effectiveness in online environments. These frameworks are integrally linked to understanding how and under what circumstances collaboration and discourse contribute to learning. Harasim draws on the processes of democratic participation, intellectual progress, and gradual convergence to adumbrate the trajectory of online learning from idea generation to idea linking to intellectual convergence. She examines how moderator functions can support intellectual and social development (discourse, conceptual change, and intellectual convergence) in online seminars.

Michalinos Zembylas, **Charalambos Vrasidas**, and **Marina S. McIsaac** in their chapter "Of nomads, polyglots, and global villagers: Globalization, information technology, and critical education online" examine the impact of the Internet on education in an increasingly global society. They address the impact of globalization and information technologies on education, emphasizing their political, social, and cultural impacts. They deconstruct the metaphor of the "global village," suggesting an alternative and more appropriate metaphor based on the work of Gilles Deleuze and Felix Guattari, Pierre Levy, and Rosi Braidotti. Using the notions of the polyglot, collective intelligence, and the nomadic thought narrative, they attempt to shed new light on the impact of information technology in education and society and help lift the veils of subjectivities and meanings constructed and conditioned in the global scene. Finally, they examine how critical emotional literacy, collective witnessing, and collective intelligence are conceptual tools that can serve within the framework of information technologies and critical education to promote social justice, equity, multicultural education, and peace education.

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CHAPTER 1

DESIGNING AND STUDYING LEARNING EXPERIENCES THAT USE MULTIPLE INTERACTIVE MEDIA TO BRIDGE DISTANCE AND TIME

Chris Dede, Pam Whitehouse, & Tara Brown L'Bahy
Harvard Graduate School of Education

ABSTRACT

"Distributed learning" is a term used to describe educational experiences that combine the use of face-to-face teaching with synchronous and asynchronous mediated interaction. This instructional strategy distributes learning across a variety of geographic settings, across time, and across various interactive media. This chapter analyzes the design and educational outcomes of a Harvard Graduate School of Education course, *Learning Media That Bridge Distance and Time*, as a prototypical distributed learning experience.

Our research shows that the integration of interactive media into learning experiences profoundly shapes students' educational experiences.

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Many students reported that the use of asynchronous learning environments positively affected their participation in the course and their individual cognitive processes for engaging with the material. In addition, students indicated that synchronous virtual media both helped them get to know classmates with whom they might not otherwise individually interact within a classroom setting and provided a clear advantage over asynchronous media in facilitating the work of small groups.

Our study also documents that most students feel something important to their learning is missing in virtual learning spaces, whether synchronous or asynchronous, if those are the only means of interaction used. However, less than half of our students ranked face-to-face interaction as their first choice of learning medium. This indicates that the full range of students' learning styles is undercut when interaction is limited to classroom settings rather than distributed across multiple media. These findings have major implications for the instructional design of both conventional distance education and traditional classroom instruction.

INTRODUCTION

With the availability of the Internet and digital technologies, many universities are integrating new interactive media into course curricula, both to enhance conventional classroom-based learning and to enable remote students to overcome barriers of time and distance. Although the focus of computer-mediated communication (CMC) in teaching and learning has traditionally been on distance education—delivering courses to students in remote locations—colleges are increasingly using CMC tools to enhance on-campus courses, with positive outcomes (Butler, 1997; Dede, 1996, 1998; Fleischman, 1999; Telelearning, 1998; Welsh, n.d.a). These "mixed mode" or "hybrid" courses combine the use of face-to-face teaching with synchronous and asynchronous mediated interaction. "Distributed learning" is a term used to describe such educational experiences, which are distributed across a variety of geographic settings, across time, and across various interactive media (Dede, 1996; Locatis & Weisberg, 1997; Saltzberg & Polyson, 1995).

In this chapter, we will present a case study of a Harvard Graduate School of Education (HGSE) course, *Learning Media That Bridge Distance and Time.* Our purpose is to analyze the design and educational outcomes of this course as a prototypical "hybrid" distance learning experience that augments occasional face-to-face instruction with extensive educational interactions across distance and time. We will first depict the pedagogical strategies and support structures used to facilitate our students' progress in collaboratively learning online. Then, we will present the theoretical

framework that guides the design of this course. Finally, we will discuss our research methodology and findings about the course outcomes.

Description of T502: Learning Media That Bridge Distance and Time

HGSE is a professional school that grants masters and doctoral degrees in three main areas of education: Learning and Teaching; Administration, Planning and Social Policy; and Human Development and Psychology. The course on which our research is based, *Learning Media That Bridge Distance and Time*, is part of the Technology in Education Program, which is housed in the Learning and Teaching area. The class consists mainly of master's degree candidates, with some doctoral students; its typical enrollment is 30–40 students from all three areas of study. A few students from other schools at Harvard and from other universities also take the course, but the largest percentage of participants is from HGSE. Students have a wide range of interests and expertise in K–12 schooling, nonprofit and for-profit businesses, higher education, and adult informal learning.

This introductory course depicts the ways in which learning and teaching across distance and time are similar to, and different from face-to-face instruction. Participants gain fluency in using various interactive media (e.g., threaded discussion sites, virtual environments, groupware, videoconferencing), infrastructures for teaching (e.g., instructional management shells), and pedagogical strategies (e.g., telementoring). For each medium, information is presented about the vision of its developers, how to use it effectively for learning and teaching, and what evaluations of its use thus far have concluded. Deliberately, the media selected are available as freeware or at very low cost to illustrate the capabilities currently available to educators with minimal resources. The course presumes a basic familiarity with computer and telecommunications applications, but has no other prerequisites.

Course Objectives and Process

The two main goals of the course are (1) to provide students with learning experiences via seven different interactive media, illustrating appropriate tasks and exemplary instructional design in each and (2) to help students develop an understanding of how each of these media shapes the cognitive, affective, and social dimensions of their own learning and the learning of others. As discussed later in the section on theoretical perspectives that inform the course design, the pedagogies used in this course are predominantly constructivist and emphasize collaborative learning-by-doing. The course "walks its talk," since students discuss the capabilities

and shortfalls of each medium by using it as their vehicle of communication for that analysis.

Leading-edge theories, research, and practice in education are presented to emphasize the cognitive, affective, and social dimensions of learning across distance and time. Topics covered range from methods for evaluating the effectiveness of current distance education approaches to the probable evolution of innovations such as multi-user virtual environments, computer-supported collaborative learning, and online communities of practice. An emphasis is placed on comprehending the implications of emerging interactive media for educational equity and for meeting the needs of diverse learners. Students are required to write two papers, selecting these from five possible topics: (1) assessing a telementoring relationship, (2) evaluating learning experiences in a multi-user virtual environment, (3) comparatively analyzing web-based learning environments, (4) examining a distance education program, and (5) evaluating alternative vendors providing a distance education product or service. Students also are expected to make extended contributions to asynchronous threaded discussions and to participate in various synchronous virtual learning experiences, receiving graded credit for this equivalent to doing a third paper.

The course's pedagogy is based on meeting face-to-face to introduce a theoretical framework about an interactive educational medium and to prepare students for their use of this medium in collaborative learning and using distance learning to model effective instructional design and appropriate educational tasks in the medium. For lack of equipment, one of the seven media is demonstrated by developers; the Concord Consortium models the use of handheld devices for teaching science (http://probesight.concord.org/). The other six virtual media are actively used by the students. For each new medium, a discussion thread is introduced to share ideas about its strengths and limits.

When it meets face-to-face, the course is taught in a large, state-of-the-art classroom. This high-tech amphitheater has both Windows and Macintosh computers available to the instructor; the output of these machines is displayed on two large video screens, with two smaller supplemental screens that improve the visual access of students sitting on the outer edges of the amphitheater's half circle. ISDN or IP-based videoconferencing, a document camera, a hookup for laptop machines, and a VCR are also available to the instructor, with similar display capabilities. All room functions are controlled through a panel on the speaker's podium. Each student's seating area has an electrical outlet and Ethernet port. There is a microphone for every two seats to facilitate videoconference interaction. The room is spacious, but achieves a sense of intimacy due to its circular design and carpeted floors and walls that suppress echoes.

Readings, writing assignments, special instructions, and course activities are listed in the online syllabus (http://www.gse.harvard.edu/~dedech/502/). The online instructional framework for the course is provided by Harvard's iCommons authoring shell (http://icommons.harvard.edu), which includes asynchronous discussion capabilities based on a modified version of WebCrossings (http://www.webcrossings.com). Each week's assignments include asynchronous threaded discussions on topics posted by the instructors. Beyond weekly meetings face-to-face or in the interactive medium currently under examination, optional lab sessions provide help to students who need technical, intellectual, or emotional support in using the course tools effectively. These weekly lab sessions aid students in reflecting on their individual and shared experiences as they first learn to use each medium and then gain fluency in its rhetoric.

Flow of Course Content

The class meets face-to-face for the first two weeks to establish both working and social relationships among learners with similar interests. In week three, the class has a virtual meeting in Tapped In, a multi-user virtual environment (MUVE) developed for educators' professional development (http://www.tappedin.org). Students are assigned to small groups that meet in a virtual conference center inside Tapped In, with the task of discussing a particular reading. Each group's interactions are monitored and mentored by the instructors, but a format for achieving fruitful discussion is not presupplied. The purposes of this first meeting are to introduce the concept of meeting in a virtual context with avatars and digital artifacts and to encourage students to begin thinking about the "rhetoric" of this medium from dual perspectives—as learners and as educators.

The rhetoric of the Tapped In environment includes developing an online identity, using text to "emote" during conversations as a means of communicating affective stance, and managing various tools (such as a virtual whiteboard) to collaboratively organize the flow of dialogue and to facilitate the communication of information. Students typically have strong emotional responses about their initial Tapped In experience that range from delight and curiosity to frustration and confusion. These feelings and ideas about the Tapped In experience are reflectively shared in an asynchronous threaded discussion, as well as in the face-to-face lab session that week.

Next, two weeks of face-to-face class meetings enable both the demonstration of the potential for distributed learning of handheld wireless devices (ubiquitous computing) and the preparation of students for collaborative use of a groupware tool called Groove (see http://www.groove.net). Groove is a team-based learning environment that allows small groups to work together on a shared document, brainstorm on a white board, explore

websites together, and talk in real time with each other, either through text or via microphones and headsets. It is similar to NetMeeting (see http://www.microsoft.com/windows/netmeeting/) but uses a peer-to-peer model of interaction with no need for a central server. The teams are asked to create an artifact within their common Groove workspace, such as a story created via synchronous writing (collaboratively writing and illustrating a text) or an architectural design for a learning setting. Again, the emphasis is on analyzing the experience from the dual perpsectives of learner and educator as well as on developing fluency in the rhetoric of "groupware."

The Groove assignment inaugurates an extended series of weeks in which the course meets solely across distance (other than optional face-to-face lab sessions). Students have a second, more advanced experience in the tools that have been introduced up to this point. For example, they meet again in Tapped In, this time to discuss and annotate websites together. Another week's assignment involves using the asynchronous threaded discussions for debates rather than dialogues. A case study assignment some weeks later has students working in small groups to design distance learning environments based on the use of six alternative interactive media. For this case study, students may work in Groove, NetMeeting, Tapped In, or Active Worlds (a graphical multi-user environment available at http://www.activeworlds.com), archiving their interactions and product for comparative analysis by other groups who completed the same task.

Following these weeks of learning across distance, a face-to-face meeting introduces videoconferencing as a medium for learning and features a discussion on intellectual property. Students begin preparing for their final virtual assignment, using one of the shared workspace tools—Groove, Tapped In, or NetMeeting—to create a vignette of a student about a decade hence using interactive media for learning. The assignment offers an opportunity for playfulness and a time to stretch one's ideas about the various uses of the tools introduced during the semester. What capabilities will these interactive media have in the future? How will this reshape the content process, organizational structures, participants, and outcomes of formal education and informal learning?

Two face-to-face sessions conclude the semester and provide the opportunity for synthesis discussions. In particular, the students individually rank the eight interactive media in the course (including face-to-face instruction) in order from best to worst in terms of empowering their learning. As discussed later in this chapter, the marked variation in rankings among students—with less than half listing face-to-face interaction as their top choice for learning—prompts lively comparative dialogues.

The course has many features typical of distributed learning. In our hybrid design, once the various interactive media are the primary means of communication, face-to-face discussion does not play its traditional role as

a locus for presenting new material. Instead, "face time" centers on questions and discussion reflecting on shared learning experiences outside the classroom meetings. Also, classroom sessions offer a social setting for sharing the emotional challenges that many students feel as they have the unfamiliar experiences both of learning across distance and of assuming responsibility for determining how much time and effort to allocate to course interactions each week.

Theoretical Framework

This course is based on a theoretical framework and research findings that guide its development. Hannafin (2000) posits that student-centered learning environments (SCLEs) are shaped by the interplay between psychological foundations that address how individuals learn and pedagogical foundations that form the structure of the learning environment. He further argued that "The key, of course, is the alignment of technology affordances with the underlying psychological and pedagogical foundations" (p. 34). Tessmer and Richey (1997) extend this framework by defining social, physical, and political factors as forming the context that shapes learning and performance. From a constructivist stance, learners are also part of the context, and their experiences as learners are the place where "contextual factors and learner characteristics are merged" (Tessmer & Richey, p.64).

Distributed Cognition. Distributed learning is enhanced by the pedagogical strategy of distributed cognition, defined by Perkins (1992) as the "dispersal of intellectual functioning across physical, social, and symbolic supports" (p. 134). As a simple example, using a word processor changes the cognitive processes involved in writing; the tool's capabilities encourage an emphasis on continual revision and refinement (implicitly discouraged by the limitations of typewriters and pencils as prior writing media.) Such cognitive partnerships between people and objects can create information-rich and student-centered learning environments that foster active learning (Dede, 1996, 1998; Fleischman, 1999; Perkins, 1992; Welsh, n.d.a). Modeling expert actions to enhance learning-while-doing, tools can provide ways to scaffold students' performances, similar to the ways in which mentors help a novice advance through a Vygotskian zone of proximal development (Bereiter, 1997; Salomon, 1993).

Emerging interactive media provide applications of distributed cognition beyond what can be achieved in face-to-face settings. In our course, the groupware tool Groove has suites of interrelated features that enhance participants' capabilities to perform particular types of tasks. Via working

with distance media that embed supports for distributed cognition, students gain leverage for types of collaboration that are difficult for classroom-based discussion groups to achieve.

Active, Collective Construction of Knowledge. Through the use of synchronous and asynchronous media that facilitate the exchange of ideas and information across time and distance, computer-mediated communication is conducive of collaborative, student-centered learning that fosters critical thinking, reflection, knowledge construction, and active participation (Bullen, 1998; Collis & Moonen, 2001; Dede, 2000; Golas, 2000; Harasim, Hiltz, Teles, & Turoff, 1995; Hiltz, 1993). When students are active in accessing information, communicating with others, and sharing ideas, CMC is effective in building communities of learners across time and distance and in fostering collaborative environments that facilitate the construction of knowledge.

A cornerstone of knowledge construction in computer-mediated environments is access to information and multiple perspectives. Students cite the ability to get "information when you want/need it" as a strength of online learning (Jensen, 2000). Modern CMC tools are very effective in this regard. The Internet offers a plethora of information on a myriad of topics. Digital libraries offer sources of both scholarly research and popular culture, enabling access to resources that until recently would have entailed physical travel by students to multiple libraries, archives, museums, and repositories. Email, listservs, and computer conferencing can provide access to content experts around the world. Both synchronous and asynchronous media provide forums for the exchange of ideas across time and distance. Another advantage of increased access to information is "just in time" learning, which occurs as new knowledge becomes relevant to a student's current work. Researchers have found that, when the acquisition and use of information are closely sequenced in time, learning is more meaningful and therefore more enduring (Jensen, 2000; Telelearning, 1998).

Our course has an elaborate, continuously updated online syllabus with links to a wide variety of distance education resources. The limited selections the students are asked to jointly discuss are filtered from a much larger set of related materials. We also provide a second subset of resources less crucial to the course but worth perusing depending on learners' interests. Instructor and student course management functions are available via the iCommons instructional shell that displays the online syllabus.

Research shows that the ability to access information across time and distance supports self-directed learning (Collis & Moonen, 2001; Doherty, 1998; Golas, 2000; Harasim et al., 1995; Hiltz, 1993; Jensen, 2000; Welsh, n.d.a). The high level of autonomy afforded by distance and hybrid

courses allows students greater flexibility to set their own pace for learning. Although autonomy is often cited as an advantage of computer-mediated learning environments, the increased responsibility placed on course participants for their own learning has been found to be challenging for some students. Studies of online learners cite "procrastination" as a concern in a flexible learning environment (Bullen, 1998; Hiltz, 1993, 1997). In addition, the very technologies that enable students to interact with peers and instructors freely across time and distance reportedly cause some students to feel disconnected from other participants and from the learning experience, largely due to a lack of face-to-face interaction (Bullen, 1998; Hara & Kling, 2000). To counter these potential problems, our course is designed around a social constructivist model of learning based on virtual communities of practice.

Social Constructivist Models of Learning. SCLEs are generally based on the educational philosophies of constructivism (students are active constructors of knowledge rather than passive recipients) and situated learning (social context and culture shapes individual understanding). Constructivist learning environments, as described by Jonassen (1996) are those in which students are "constructors and producers of personal knowledge" (p. 13). He contends that "when learners actively construct knowledge, it is more meaningful, applicable, and memorable" (p. 13). Building on Jonassen's work, Maddux (2001) has identified attributes that foster SCLEs. Included among them are collaborative and cooperative learning, learning communities, and reflective learning.

Within the educational technology literature, such social constructivist learning pedagogies are often associated with the use of online learning networks. A prevalent model for this approach is virtual communities of practice (Wenger, 1998), collaborative groups of professionals who develop shared resources (e.g., problem-solving strategies, terminology, tools) and who promote ongoing reflection and feedback to advance their learning goals over time (Goldman, 2001; Honey & Hawkins, 1998; McDonald & Songer, 2000). In our course, we use a social constructivist approach that fosters the formation of virtual communities of practice among students. These knowledge-building networks are based on understanding the usage, strengths, and limits of various interactive media; developing a common vocabulary about issues; and acquiring problem-solving strategies to cope with challenges in implementing and integrating distance learning into educational settings.

Situated Models of Learning. Our course design also emphasizes "situated learning," which Greeno (1994) has characterized as constellations of architectural, social, organizational, and material vectors that shape partic-

ular settings, providing a definitive context that determines culturally acceptable practices of learning. The unit of analysis is neither the individual nor the setting, but instead the relationship between the two. From a situated viewpoint, learning is embedded within and inseparable from participating in a system of activity in a particular setting (Brown & Collins, 1989; Chaiklin & Lave, 1993; Lave, 1988; Lave & Wenger, 1991). Studies of apprenticeship (the process of moving from newcomer to oldtimer within a given set of practices) are a central model for situated learning in our course; using the shared virtual environment Tapped In enables students to experience how avatars, digital artifacts, virtual contexts, and a communal culture shape learning in a setting different from conventional face-to-face environments (Schlager, Fusco, & Schank, in press). The unfamiliarity of this context provides psychological distance that enhances students' abilities to recognize the situated aspects of their learning.

Tessmer and Richey (1997) indicate that "context has a complex and powerful influence upon successful performance-based learning, and yet is largely ignored—or at least de-emphasized—in most current instructional design models" (p. 42). Distributed learning environments provide contexts where "a multilevel body of factors in which learning and performance are embedded" in various types of learning settings (Tessmer & Richey, 1997, p.42). In other words, a distributed learning environment offers multiple entry points to different types of learners.

Learning Styles. Dede (2000) describes the facilitation of distributed learning as "orchestrating educational activities among classrooms, workplaces, homes, and community settings" (p. 187). Given that people typically function in their homes, workplaces, and communities, extending learning opportunities into these realms of students' lives can foster deeper engagement with course content (Perkins, 1992). Through coupling face-to-face interaction with synchronous and asynchronous mediated communication, hybrid courses can provide distributed learning environments that address a variety of learning styles within diverse student groups.

"Learning styles," as described by Keefe (1987), are preferred ways through which learners interact with and process information in learning environments. Williams and Peters (1997) state that online environments offer "a better environment to accommodate flexibility in learning styles" (p. 67). Likewise, Sanchez and Gunawardena (1998) indicate that the variety of instructional activities and resources supported through new technologies can provide an individual learner with "an opportunity to excel in ways in which he or she prefers to learn" (p. 61). Empirical studies of web-based learning support these assertions; however, there is also evidence

that online environments can pose obstacles to student learning (Bullen, 1998; Hara & Kling, 2000; Hiltz, 1993; Mason & Weller, 2000).

Kitchen and McDougal (1999) found that 12% of the students in their study had a poor learning experience in an online graduate course, and only 18% felt that their learning was better than an equivalent face-to-face instructional setting. Their findings are typical of student experiences in conventional online courses—participants like the flexibility, but are frustrated by technical barriers and the lack of face-to-face interaction (Kitchen & McDougal, 1999). Rather than including some face-to-face interaction plus community building via a wide spectrum of synchronous and asynchronous media, conventional distance education offerings typically provide only a few, solely online means of interaction. Outcomes such as those discussed above reflect the intrinsic limitations of online courses that do not offer the full affordances of a distributed learning environment. As a result, many distance education courses support only a narrow range of student learning styles.

In contrast, the cognitive, affective, and psychosocial impacts of CMC are explicitly addressed in the instructional design of *Learning Media That Bridge Distance and Time*, as reflected in class assignments. For each interactive medium and educational environment, students analyze their own experiences in the class, asking "How does this virtual setting shape my thinking? My emotions? My relationships with others?" Our analysis of students' perceptions about these issues is discussed later in the research findings section.

Asynchronous Learning. Computer-mediated, asynchronous environments —otherwise known as *Asychronous Learning Networks* (ALN)—are those in which individuals and/or groups can interact online "without both parties being logged on at the same time" (Berge, 2001, p. 369). In addition, because ALNs are Internet-based, they are not location-dependent. Examples of asynchronous environments include websites, email, listservs, and threaded discussions. The technologies required to support ALNs—essentially computers and Internet connections—are now widely available in many universities, workplaces, and homes. The accessibility and flexibility of ALNs make them a cornerstone of distance education.

At present, the majority of empirical studies on education across distance focus on the use of ALNs in the learning and teaching processes. The potential of ALNs to provide access to information, enable participant interaction and collaboration, allow for active and self-paced learning, and foster student reflection and critical thinking are some of the benefits identified by educational researchers (Bonk & Reynolds, 1997; Dede, 2000; Doherty, 1998; Harasim, 1990; Harasim et al., 1995; Hiltz, 1997; Jonassen,

1996; Khah, 1997). These benefits have been found in both distance education and hybrid courses.

One of the advantages of asynchronous CMC is that it allows "more time for students to form responses than in face-to-face or other synchronous, real-time environments" (Bannan-Ritland, Bragg, & Collins, n.d.a.). Given that ALNs are not time-constrained, allow for revisions, and preserve a record of postings, students are more thoughtful and succinct when contributing to online discussion. As Golas (2000) points out, "theorists have found that it is through the actual process of writing our thoughts and working them over that we really come to understand." As discussed in our findings, our learners find the asynchronous threaded discussions in the course valuable, with over half the students listing these as their first or second choice of the eight learning media available.

Drawbacks in the use of ALNs also are reported, particularly in courses that are exclusively asynchronous across distance (Hara & Kling, 2000; Mason & Weller, 2000). Ironically, many of the challenges reported by students in their use of ALNs are derived from the same aspects reported as benefits. For some learners, enhanced access to resources leads to a feeling of being overwhelmed by the amount of information available (Hara & Kling, 2000; Harasim et al., 1995; Mason & Weller, 2000). In addition, students have reported that the easing of time constraints, which allows learners to be self-paced and to engage with the course at times that are personally convenient, can present increased time management challenges (Bullen, 1998).

Many of the optional face-to-face lab sessions in our course center on providing intellectual and emotional assistance for students faced with these types of challenges regarding their own learning. As class participants build a distributed learning community through a variety of instructional supports in the course, we support each student in developing an effective balance of external guidance and internal responsibility.

Synchronous Environments. Synchronous environments are those in which individuals and/or groups are "speaking and listening to one another in real time" (Berge, 2001, p. 377). Real-time communication can occur both *on* and *off-line*. Face-to-Face (F2F) classrooms in which students and instructor(s) are physically present are one type of synchronous environment. Computer-mediated examples include chat rooms, real-time computer conferences, groupware, webcasts, and Multi-User Virtual Environments (MUVEs).

Given that Synchronous Learning Networks (SLNs) generally require more sophisticated technologies than ALNs, their integration into K–12 and higher education curricula has progressed at a slower rate, and thus, they are not explored as extensively within the literature. In recent years,

the use of real-time, computer-mediated communication tools has increased and educational researchers have found them to be valuable in increasing interaction between course participants, supporting collaborative learning, and fostering social relationships between individuals (Anderson & Garrison, 1998; Berge, 2001; Bullen, 1998). Within a distance or hybrid course, real-time online communication may serve to "ease the transition" into ALNs for students who are accustomed to face-to-face, classroom-based learning (Bullen, 1998).

In our course, we provide students with direct experience in the use of four synchronous media: face-to-face interaction, videoconferencing, shared virtual environments, and groupware. As the conventional classroom method, F2F interaction is generally positioned as a standard by which ALNs and SLNs are measured as either effective or ineffective. Although some aspects of CMC tools have been found to be more effective than F2F interaction in learning and teaching, students often report that CMC does not adequately simulate aspects of F2F communication that they feel are important to their learning experience (Bannan-Ritland et al., n.d.a; Bullen, 1998; Harasim, 1990). Jensen (2000) warns educators to "try to resist temptations to dehumanize some courses by eliminating face-to-face encounters," emphasizing the importance of F2F interaction and highlighting the potential of hybrid courses in addressing these issues. Later in the chapter, we discuss this issue at length when analyzing our students' rankings of the eight media in terms of their individual learning styles.

RESEARCH METHODS

Our methodology in this research is based in a grounded constructivist perspective. "Constructivism assumes the relativism of multiple social realities, recognizes the mutual creation of knowledge by the viewer and the viewed ... and we can use grounded theory methods as flexible, heuristic strategies, rather than formulaic procedures" (Denzin & Lincoln, 2000, p. 189). In order to explore the processes and outcomes created by the interactions among learners, distributed learning media, and instructional content and strategies, we chose to combine both qualitative and quantitative analyses of our instrumental case study (Stake, 1995). This approach offers a multidimensional portrait of student experience grounded in course design.

Since we intend to continue analyzing data as an ongoing research project, the overall design is a qualitative/quantitative linking wave design, as described by Miles and Huberman (1994). The design begins with a qualitative methodology in which we developed a conceptual context for our study based on a review of the literature and our own experiences with

teaching and learning in distributed multimedia learning environments. For the spring 2001 offering of T502, we formulated a survey based on our conceptual context and used the data collected from that survey to further develop our understanding of students' experiences, although this data is not included in our present study. For fall 2001, we developed another survey, informed by our learning from the previous year, conducted student focus groups, and used various forms of computer-based analysis for qualitative data (Miles & Huberman, 1994). Analysis included an examination of the content of student postings in threaded discussions. "Content analysis is useful for investigating these socially constructed meaning processes, as evidence of them is found in the text of the message" (Sherblom, Reinsch, & Beswick, 2001, p. 24). This sort of analysis seemed particularly useful in learning more about the ways in which students understood and used the discussion groups to reflect on course reading assignments and media tools. In the future, we plan to use neural network analysis and other emerging coding methods to mine our data more deeply.

In this chapter, we present our findings in terms of the overall themes that arose from the student survey, media rating survey, student focus groups, and course evaluations. Maxwell (1996) posits that triangulation of data collection methods "allows you to gain a better assessment of the validity and generality of the explanations you develop" (p. 75–76). This approach of using both qualitative and quantitative data collection methods through surveys, focus groups, and the evaluation of threaded discussions and media rankings provides a variety of perspectives on student participation and media use. Our methodology not only fosters a "thick" description of the students' experiences, but also provides a portrait of student learning across the social, affective, and cognitive dimensions of the distributed learning classroom.

DATA COLLECTION

We introduced our research to the T502 class at the first class meeting and explained that students' voluntary participation would entail both filling out pre- and post-course online surveys and granting us permissions both to use their course grades as one measure of educational outcomes and to analyze archives of their synchronous and asynchronous interactions. We assured students that they would never be visible as individuals in our research and that our analysis of their class work and survey responses would not begin until final grades were submitted. We then distributed informed consent forms to all present. At their leisure, students could choose to sign or not without any penalty or pressure.

The quantitative data collected for this research included pre- and post-course survey data, frequencies of posting and content analysis of individual participation in the synchronous and asynchronous discussions, and students' final grades. Thirty of 34 enrolled students chose to participate in our study and completed the initial survey in September 2001; 25 students filled out the survey at the end of the semester in January 2002. The online survey consisted of 24 questions that provided some background information and addressed students' perceptions about and experiences with computer and Internet tools (Compeau & Higgins, 1995). The pre-course survey was closed to student access ten days after the beginning of the semester, and the post-course survey was closed a week after the last class meeting.

The qualitative data collected for this research included postings in the threaded asynchronous discussion forum and synchronous tools, videotaped focus groups, and our own notes from class discussions and conversations with students. The focus groups took place during the last class of the semester, with 31 of 32 enrolled students participating (two students dropped the course during the semester). We divided the class into two groups and asked a series of open-ended questions designed to add another layer of detail to our survey questions.

RESEARCH FINDINGS

Below are preliminary research findings from our studies on *Learning Media That Bridge Distance and Time.* We are continuing to collect and analyze data about this course as it evolves over time. In particular, we are developing case studies of various types of students, relating their individual demographic characteristics to their preferences, capabilities, and learning outcomes in using the eight interactive media in the class. Based on our findings, we also are delineating design guidelines for learning experiences that use multiple interactive media.

Comparison of Learning Media

In the survey administered at the beginning of our class, the overwhelming majority of students reported that they believed new technologies could provide them with effective learning experiences. However, students also reported a wide range of technical skills, experience, and comfort with online asynchronous and synchronous tools. They also differed greatly in self-reports of their typical levels of participation in traditional, face-to-face class discussions. From the initial survey, it was evident that students in the class could not be uniformly characterized in terms of learning styles but

rather, represented a wide spectrum of experiences, comfort levels, and participatory style within various types of instructional environments.

At the end of the course, we asked our students to rank the eight different media with which they worked during the semester: face to face, websites of various types for informal learning, Groove, Tapped In, wireless handheld devices, videoconferencing, asynchronous threaded discussions, and iCommons, the course instructional shell. We provided a context for thinking about how to do this ranking by phrasing our evocative question in the following way:

> To maximize your learning in the course, which media would be most efficient and effective? Which least? Focus primarily on how each medium shapes the quality of information and interaction you receive and contribute. As a secondary consideration, you could factor in your "comfort" with the medium. This is in part how easy and enjoyable a medium for learning you find each, now that you know how to use it fluently and well, but could also include some measure of how much time and effort it took to master the medium and its rhetoric. In addition, "comfort" would reflect how motivating you find the medium itself (as opposed to its content) in stimulating you to keep learning.

The following table presents a summary of the rankings, which form a portrait of how students' made sense of their learning experiences using the various interactive media presented in the course. About 43% of the students who chose to make a first choice (31) ranked face-to-face learning as their top ranked choice, while nearly 25% chose the discussion forums for their top ranking. (The low ranking of wireless handheld devices and of videoconferencing was likely due to students having limited or no direct experience with these.)

Table 1.1. Class Rankings of Media by Percentage

	First	*Second*	*Third*	*Fourth*	*Fifth*	*Sixth*	*Seventh*	*Eighth*
F2F	43%	34%	n/a	17%	n/a	0	0	0
Asynchro.	29%	24%	17%	17%	n/a	n/a	n/a	0
Tapped In	16%	14%	32%	27%	n/a	n/a	0	0
Groove	0	17%	15%	n/a	30%	15%	n/a	n/a
Video	n/a	n/a	n/a	n/a	13%	12.5%	41%	15%
iCommons	n/a	n/a	11%	17%	n/a	22%	n/a	n/a
Informal	n/a	n/a	11%	n/a	23%	25%	17%	15%
Wireless	n/a	n/a	0	n/a	n/a	15%	27%	53%

Percentages are rounded up to the next number; *n/a* is used when the votes are <4, so columns will not add to 100%. Total number in the class= 34; however, the votes for rankings varied from n=29 to n=34. Percentages are based on actual number voting in the particular ranking.

At first glance, this summary reveals a picture expected from our earlier synthesis of the distance learning literature: Face-to-face interactions were highest in both first and second place rankings. This replicates the results of many distance education studies—that students often feel that something important to their learning is missing in virtual learning spaces, whether synchronous or asynchronous, but to stop at this superficial level would not give an accurate portrait of our findings.

A closer look reveals a strong argument for a distributed learning design. For example, nearly 30% of the class ranked ALNs as the most effective and efficient learning medium, while nearly another quarter of the class ranked ALNs as their second most efficient and effective learning medium. Thirty-two percent of the class ranked Tapped In as their third choice of learning media, while over a quarter of the class ranked it fourth. These student preferences make a strong argument for using highly ranked multimedia tools to complement face-to-face learning.

Of particular note is that less than half of the students ranked face-to-face interaction as their first choice of learning medium. This lends credence to our claim that the full range of students' learning styles is undercut when interaction is limited to classroom settings rather than distributed across multiple media.

The table above reveals variations in learning styles for this particular group of students, who likely are representative of a broad population of graduate students. The top-ranked media illustrate multiple leverage points for various types of educational interactions in a distributed learning environment. This data reveals "a multilevel body of factors in which learning and performance are embedded" in the various types of multimedia and makes apparent the places in which "contextual factors and learner characteristics are merged" (Tessmer & Richey, 1997, p. 85). Whether students' educational experiences are enhanced or challenged by any particular learning medium, these findings point to the fact that such tools are not neutral content delivery mechanisms. Rather, research shows that the integration of interactive media into learning experiences profoundly shapes students' educational experiences, in part by altering the types of pedagogy the instructor can use.

Asynchronous Learning

As can occur in traditional, face-to-face classroom conversations, students varied in their participation in online discussions. A cross-analysis of survey and threaded discussion data revealed no significant correlation between students' initial comfort or experience levels with technology and the number of posts to the online discussion forums. That is, students who

initially reported being "novice" technology users, or uncomfortable or inexperienced with asynchronous CMCs, did not have lower rates of participation than "experts" or those who reported being very comfortable with CMCs. Despite the fact that some students reported slow Internet connections and others were dissatisfied with the structural design of the threaded discussion tool, there is no evidence to suggest that these challenges resulted in overall lower rates of posting.

One aspect of the course on which students overwhelmingly reported favorably was their access to the teaching staff via asynchronous tools (e.g., email and threaded discussion). Although in focus group discussions a few students wished they had seen more of the "sage on the stage," most felt that throughout the course, they had more access to the instructor than in many traditional courses they had taken in the past. One student reported, "I don't think I have ever had as much access to my professor. In terms of access, I think it's unparalleled." In the end-of-class survey, another student wrote of the computer-mediated communication in the course: "[It] provides more opportunities to interact with professors in a non-threatening, more casual way."

This finding is also corroborated by data from the end-of-course survey, in which 90% of students reported that it was easy to interact with the professor online, compared in the initial survey to only 68% estimating this would be true.

Two aspects emerged as particularly important to students' level of satisfaction: timeliness and depth and clarity of responses. Students reported that prompt responses from the instructor and teaching fellows (TFs), particularly in response to email messages, "helped a lot" and "made this work" in terms of keeping them connected to the course during times when the class did not meet face-to-face. The quality of feedback, which students described as "clear" and "constructive," helped to clarify goals and expectations.

In empirical studies of students' experiences in computer-mediated courses, Bullen (1998) and Hara and Kling (2000) argued that when students perceive lags in instructors' responses to email messages or feel that responses are not adequate, this negatively impacts their experience and participation level. Confirming these results, we found the quality and timeliness of feedback from the instructor and TFs to be factors that significantly enhanced students' learning, participation, and level of satisfaction.

Many students reported that the use of ALNs positively impacted their participation in the course and their individual cognitive processes for engaging with the material. Students reported that they liked the "flexibility" of being able to participate in asynchronous discussions when convenient to them. For many, web-based course materials (e.g., syllabus, assignment criteria, required readings) enhanced the accessibility of the

course content. In addition to its convenience, some students liked that ALNs offered another way to participate in addition to speaking in face-to-face conversations. This was particularly true for students who are not comfortable engaging in large group discussions. As one student wrote in an online posting,

> I'm very surprised at my high ranking of the asynchronous discussions. At the beginning of the class, I did not feel comfortable posting but as the semester went on, I became more at ease using this medium and almost prefer it to F2F. I like to have time to gather my thoughts, and I especially enjoyed reading all the postings. It's also a great way for a not very vocal/shy person to express their opinions. It just took me some time to become comfortable with it.

The threaded discussions also helped students to grasp ideas presented in the readings. One student commented that having online access to her classmates' perspectives on and thoughts about readings helped in her own understanding. Likewise, other students reported that reading classmates' postings beforehand helped them to better identify important themes within the articles. In addition, as one student stated, "the ability to freeze and reread comments helped me to think through issues better and led to better discussions" than in face-to-face conversations. We also found that students responded to each other's postings individually through email; this enabled them to have a one-on-one "back and forth" conversation, which is difficult to do in a large classroom setting. This suggests the power of CMCs to foster student learning through peer interaction and the exchange of ideas.

As in other empirical studies, we also found that many students felt that ALNs often fostered better quality conversations than they had experienced in traditional classrooms (Collis & Moonen, 2001; Doherty, 1998; Golas, 2000; Harasim et al., 1995; Hiltz, 1993; Welsh, n.d.a). The survey at the end of the course revealed a substantial increase over the initial survey of students reporting that CMCs made it easier for them to interact with classmates. Although some students felt that, early on, the online discussion lacked candor, most agreed that by the middle of the course, the discussions had become "more genuine." This shift in the quality of conversation over the course of the semester may have resulted from students' increased familiarity with each other and with communicating via ALNs. Fifty-three percent of students who responded to the post-course survey reported being "very comfortable" with ALNs, as compared to only 26% in the pre-course survey. This indicates that comfort with computer-mediated tools, though important, was not the only factor influencing the quality of online discussions. Our findings suggest that the facilitation of

relationships between students—through synchronous virtual and face-to-face interactions–enhances the quality of asynchronous online discussions.

A phenomenon that we uncovered in the focus groups, not evident in the distance education literature, was students' disappointment with logging into an active online discussion and finding that the idea(s) they had planned to post had already been posted by a classmate. The frustration of having "nothing new to say," particularly in forums in which participation was required, was also expressed by students in the course the previous year. One student described arriving "late" to a discussion as being "a day late and dollar short." This experience is certainly not limited to electronic discussions, but students described it as being "more in your face" in an online, text-based conversation than in classroom settings. That is, the ability to "see" the ideas, rather than merely hearing them, made them more tangible for students and, for some learners, more formidable.

One of the strategies students used to address this issue was to try to post "early." It is interesting to note that students' use of "early" and "late" are more reflective of the progress of discussions than of time. Although the sequence of postings corresponded to a linear timeline, arriving "late" to a discussion board meant that a significant number of messages had already been posted, regardless of time elapsed since the dialogue began.

In response, some students felt pressured to be the first to post to a discussion forum and to post "thoughtfully and at length." This relates to the concept of students being more thoughtful in their posts but also implies that there is a finite amount of "good and thoughtful" responses that can be derived from a particular reading assignment; therefore, there are diminishing returns to continuing discussions on an indefinite basis. This situation appears to have led to a certain level of competition between some students. Some other strategies were to post before reading others' messages, to concur with a classmate's message, to build upon the ideas of others' postings rather than trying to formulate a new idea, or to simply not post at all.

Further investigation revealed that our students also felt that participants who posted "peripheral" ideas were most helpful, as they offered new avenues for taking part in the discussion. We believe that part of this issue arises from students having time to build and articulate their ideas through writing them out. We also posit that part of the issue arises for emotional reasons; students in the focus groups said that they felt overwhelmed if there were a large number of new postings when they opened up the discussion forum and sometimes responded by simply closing the forum without posting. This is an indication that many of our discussions should have been split into more groups with fewer participants in each.

One of the strengths of ALNs reported by the literature is that they result in more clearly thought-out and articulated comments, due to the

time students are afforded for contemplating, reflecting upon, and constructing their ideas (Bonk & Reynolds, 1997; Doherty, 1998; Harasim et al., 1995; Hiltz, 1997). In contrast, face-to-face conversations, in which ideas are often formulated "on the fly," may present more opportunity for the co-construction of knowledge and ideas in ways with which many students are more familiar. On the other hand, the "day late and a dollar short" phenomenon, though frustrating for a significant number of students, was not universal and seems connected to students' individual learning and participation styles. Students who said they were customarily very quiet in the classroom felt that the online forums enabled them to participate more in class discussions. One student, who described herself as "shy," stated, "Sometimes you want to say something (in face-to-face environments) and the moment just passes you by, so I appreciate the asynchronous discussions."

As asserted by the literature, ALNs—particularly when participation is compulsory—require students to be active learners. This is seen as a strength of CMCs. However, as one student stated, "This medium may require some people to be a kind of learner that they are not." Indeed, according to our data, the students with the highest number of overall postings to the discussion boards tended to be those who reported that they were customarily "vocal" in face-to-face class discussions. Although this finding was not statistically significant, typical participation in face-to-face discussion yielded the highest correlation to number of online posts among the data collected. How student learning styles and preferences are either enhanced or hindered by particular computer-mediated tool is an area for further research.

As reported in other studies, we found lengthy discussion forums to be a source of frustration for many students (Harasim, 1990; Mason & Weller, 2000; Orange & Hobbs, 2000). As the number of messages increased, students with dial-up Internet connections experienced increased load times and inaccessibility to the forums, and many students found managing the sheer number of postings to be a challenge. The design of the WebCrossing courseware in iCommons does not allow for the collapse of threads within discussion forums. Therefore, to find a particular message, one must scroll through a list of previously posted messages. Although new messages are indicated with a red exclamation point, those indicators are never removed, making them ineffective in identifying new postings. Some students felt that they "didn't want to be constantly checking folders for new postings" and would have rather been notified by email of new messages.

Another drawback of the threaded discussion tool was the fact that individual messages were limited to a particular number of words. Some students reported having messages abruptly "cut off." Despite the frustration of some students regarding the word limit, constraining the length of indi-

vidual postings may have some value in controlling the file sizes of discussions (particularly for students with slow Internet connections) and in enhancing students' ability to manage information. Some students found lengthy postings to be overwhelming and confessed that, when they saw messages of a certain length, they simply did not read them. It is not clear whether the failure to read particular messages directly affected students' learning in the course, but this does suggest the potential for a decline in the exchange of ideas.

In comparing total numbers of posts to individual discussion forums, we found the greatest numbers of messages in forums in which participation was required. Optional discussion generated far less activity. The "Birds of a Feather" forum was created as a space in which students could explore topics of their own choosing. This proved to be the least utilized forum. Some students did take advantage of forums designed specifically for group formation around certain assignments, but others reported that they chose to use email, the telephone, and face-to-face interactions to form groups.

Synchronous Online Environments, Including Face-to-Face Interactions

In the pre-course survey, eight students (26%) reported having no experience with online, synchronous communication tools. Of the 23 students who reported that they had used SLNs, only five felt "very comfortable" with their use. However, many who responded to the post-course survey reported higher participation rates in online class discussion via SLNs than via ALNs or in face-to-face classroom discussions. Likewise, in focus group interviews, students generally responded positively to the use of SLNs, although particular tools were rated more favorably than others.

Of the SLNs used in the course, students reported most favorably on Tapped In, a multi-user, object-oriented environment (MOO), designed to support the work of educators through online collaboration in a virtual environment. The level of support provided by Tapped In staff, its ease of use, the "richness" of the environment, and the opportunity to connect with other educators were all reported as benefits of Tapped In. Students with dial-up modems did not report any technical difficulties or lag time with Tapped In, and the instructors found Tapped In to be very accessible to everyone in the class. Also, many students felt that, of all the SLNs used in the course, Tapped In most closely simulated face-to-face interaction. One student commented that she "could share emotions and humor" in Tapped In. The only drawback cited was that, due to the real-time, text-based nature of the interaction, students who did not type well felt they

were at a disadvantage. One of the few students who did not feel Tapped In was conducive to her learning said, "I'm a slow reader and typer, so synchronous is difficult."

Groove rated less favorably than Tapped In, but for many, it was an effective tool, particularly for group work. Students liked the co-navigational features of Groove, which enabled them to view websites, the whiteboard, and text-based documents from remote locations simultaneously. They felt that the "peer-to-peer" interaction supported by Groove was "very rich" and effective in fostering collaborative learning. Conversely, some students felt that Groove had "too many options," which led group members in different directions and made staying on task more difficult. Many students agreed that they were most successful using Groove for collaboration when there was a clear goal. As one student stated, "Groove was best suited for three or four people, working on a specific problem."

Two technical aspects of Groove that caused frustration are that it is Windows platform-dependent and requires file downloads during sessions. Macintosh users had to travel to campus to participate in Groove sessions, which detracted from its convenience as a collaborative learning tool. Likewise, some students with dial-up modems also reported having to use Groove at school due to prohibitive file download times.

Data from the focus groups and the rating scale suggest that many students did not find videoconferencing (VC) to be particularly conducive to their learning relative to other CMCs. However, in this course, the potential for VC as a learning tool was not explored as indepth as were other media. The use of VC was intended as an introduction to the technology and for the specific purpose of presenting a guest speaker. Although there was a question and answer segment, some felt that this single experience lacked "real dialogue."

Aspects of the videoconference on which students reported negatively were not inherent to the technology itself but rather, reflected the format of interaction, which was largely "one to many." One student said that it felt "like a lecture on video," and most agreed that they would have liked more interactivity. Feedback from students leads us to believe that effective learning experiences can be designed using VC and that "interactive exchange," is an important component (Laffey & Singer, 1997). Given its ability to span distance and to address disadvantages reported in the use of other CMCs (e.g. delayed feedback and the absence of visual cues), VC has substantial possibilities for "many-to-many" communication and for group collaboration in a learning environment.

Overall, students largely felt that the use of SLNs in the course enhanced their learning experience and complemented other delivery modes used in the course including face-to-face. They felt that SLNs (as well as ALNs), helped them get to know classmates with whom they might

not otherwise individually interact within a classroom setting. According to the data we collected, students perceived SNLs to have a clear advantage over ALNs in facilitating the work of small groups. As one student who preferred SNLs said, "If you're collaborating, it's horrible to try to do that asynchronously."

Two particular themes that emerged from a comparison of CMCs and face-to-face interaction were the fostering of relationships and goal setting. Most students felt that informal interaction and the development of social and working relationships was very important to their learning experience in the course. Although CMCs enhanced communication and facilitated "a variety of levels of social interaction," students did not feel interactive media could easily replace face-to-face interaction in the fostering of relationships. Students who chose to regularly attend the voluntary weekly lab sessions felt that the casual, face-to-face contact with the TFs and their peers was important in keeping them connected to the course and in developing greater levels of comfort with their classmates.

A significant number of students reported that establishing "trust" and a sense of collegiality in face-to-face interactions made collaboration via CMCs more effective. As one student wrote, "If I do not have a previous relationship with someone, I sometimes find it hard to read their tone or manner in a synchronous environment, and this makes me more uneasy than I would normally be with people, which is somewhat extroverted."

Students felt that meeting even one time in-person made their group "stronger," "more cohesive," and better able to get work done at a distance. At least in part, this appears to be due to some students' perceptions that it was easier to define goals face-to-face than in online meetings. As stated earlier, having clear goals emerged as important to effective online group meetings. A significant number of students felt that goals were most effectively defined face-to-face; some found that the telephone worked equally well.

One aspect of the course to which we attribute the popularity of face-to-face interaction was the effectiveness of the informal labs, which were changed in format from the previous year. Lab sessions in this course were held more regularly (weekly rather than sporadically) and were more intently planned, consisting of structured "tutorials" and time for informal interaction. These factors, we believe, led students to attend in greater numbers and to place a higher value on face-to-face interaction in the course.

A Hybrid Model Combining Face-to-Face with Interactive Media

A hybrid model of learning interweaves face-to-face interactions with communication via a range of interactive media. As evidenced by the data below, students felt that the various media used in *Learning Media That Bridge Distance and Time*—asynchronous, synchronous, and face-to-face—were mutually beneficial in supporting students' learning. Following are students' statements that reflect how they experienced the intersection between different media in the course:

> "My experience in T502 has made me much more comfortable using both synchronous and asynchronous environments ... I can see how I might augment face-to-face projects and coursework using these media."
>
> "The interaction and exchange in the synchronous environments gave me some confidence to then participate in the asynchronous discussion."
>
> "I like the way the electronic tools enhance the face-to-face interaction."
>
> "I now have an indepth knowledge of multiple (8) mediums used in learning. I have also changed my perspective about my ability to successfully engage in a distance education program."
>
> "This course is designed around the variety of technologies used within it. This was really central to my learning. My interactions with my classmates varied when we were meeting asynchronously versus synchronously or face-to-face. These experiences, while sometimes hard to organize, helped me to better understand the course content."
>
> "Having a hybrid [model of course delivery] offers more opportunity for people to participate."
>
> "As we worked in different technologies, people had differing feelings toward each. While I might prefer one over another, someone else might have the opposite reaction. Understanding these differences in our learning styles and preferences gives an insight into understanding how to deal with a diversity of learning in a distance learning environment."
>
> "Online education provides more opportunities to interact with professors in a non-threatening, more casual way. It also allows more flexibility and accommodation for learning styles than does traditional education. A hybrid mix of both is the true answer to a quality education."

Based on these responses and a variety of other findings from the course, we believe that for most learners, face-to-face interaction can effectively serve to foster productive learning via technology-mediated communication. The amount of "in-person" communication needed to empower technology-mediated learning likely varies depending on student charac-

teristics, the content and skills to be mastered, the instructor's teaching preferences and style, and the desired outcomes of the course.

CONCLUSIONS

Our findings from this course deepen and extend similar outcomes documented by others studying the use of multiple media in educational settings. Most students feel that something important to their learning is missing in virtual learning spaces, whether synchronous or asynchronous, if those are the only means of interaction used. However, less than half of our students ranked face-to-face interaction as their first choice of learning medium. This indicates that many students' learning styles are undercut when interaction is limited to classroom settings rather than distributed across multiple media.

Our research also shows that the integration of interactive media into learning experiences profoundly shapes students' educational experiences. Many students reported that the use of asynchronous learning environments positively affected their participation in the course and their individual cognitive processes for engaging with the material. Students also indicated that threaded discussions online often fostered better quality conversations than they had experienced in traditional classrooms.

In addition, students generally felt that the use of synchronous media in the course enhanced their learning experience and complemented other delivery modes used in the course, including face-to-face. They indicated that synchronous virtual media helped them get to know classmates with whom they might not otherwise individually interact within a classroom setting. Synchronous media also provided a clear advantage over asynchronous media in facilitating the work of small groups.

Comparative rankings by students of the eight interactive media we used demonstrate that a threshold of face-to-face interaction seems to empower productive learning via mediated communication and vice versa. This affirms the fundamental premise of instructional design based on distributed learning: that no single medium or small set of media can facilitate the full range of students' learning styles and needs. Three decades of research in distance education are largely off-target because studies have typically compared a single medium (e.g., face-to-face) to another medium (e.g., videoconferencing) for a group. Some learners are empowered in each situation; others are disenfranchised—the result is generally a finding of "no significant differences." Work in distributed learning suggests that the use of multiple media is significantly better. This has major implications for both conventional distance education and traditional classroom instruction.

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CHAPTER 2

A CONCEPTUAL FRAMEWORK FOR STUDYING DISTANCE EDUCATION

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ABSTRACT

The field of distance education has changed dramatically over the last 30 years. Technological developments have enabled interaction and collaboration among multiple users at a scale never imagined. As the field of distance education grows and expands, so does the need to re-examine its fundamental assumptions and perspectives. Interaction has been identified as one of the major constructs in distance education research. Seen through a symbolic interactionist lens, interaction is defined as reciprocal action between two or more actors within a given context. This chapter will present a symbolic interactionist conceptual framework for studying distance education and distributed learning environments, discuss findings of research studies

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from which the framework was generated, and address the implications of this framework for the study of distance education. The framework consists of the categories of context, learner control, social presence, structure, feedback, dialogue, and interaction. It will be argued that theories of distance education, such as the theory of transactional distance, need to be revisited taking into account the affordances of technologies currently available in distance education and pedagogical approaches based on constructivism, collaborative learning, and learning communities. Samples of research questions are proposed that can help educators better understand and improve the field. "Distance" cannot be the defining characteristic of the field. We need to move away from distance, geographical or psychological, and focus our inquiry on those pedagogical intentional interactions mediated by technology and constructed by learners, teachers, and tutors while designing and participating in distance education programs.

INTRODUCTION

Distance education as a field has grown from simple correspondence education to a highly sophisticated, distributed, interactive learning experience. An indication of the shift of emphasis in the field of distance education during the last few decades is the fact that in 1982, the International Council for Correspondence Education (ICCE) changed its name to the International Council for Distance Education (ICDE). Modern interactive telecommunications technologies, such as computer conferencing, permit synchronous and asynchronous interaction among persons on a scale never imagined when correspondence courses were the preferred alternative to traditional schooling. Students, educators, scientists, scholars, researchers, and practitioners participate in online communities, collaborate on projects, share information, and construct knowledge as never before.

As the field of distance education grows and expands, so does the need to re-examine its conceptual foundations. The field of distance education has not kept up with developments in educational technology; the need exists to reconsider its assumptions and theoretical foundations (Garrison, 2000). Educators are confused about what distance education is and what terms such as "distance learning," "distributed learning," "e-learning," "online education," and "virtual education" mean. However, with more schools offering courses as a combination of interactions face-to-face and at a distance, clear-cut boundaries between distance education and other forms of education are becoming obscured. The term "distance education" fails to capture the essence of education taking place when the teacher is not physically present (Shale, 1990). It is argued that the metaphor of "delivering education at a distance" is flawed, and it fails to credit education and learning that have been taking place for thousands of years when

learners learned without the physical presence of a teacher. Burbules and Callister (2000) argued that

> ... as the Internet becomes not only an archive of information, but an actual medium of communication and collaboration ... the metaphors of "distance" and "delivery" (transporting something over a distance to give to someone) are less appropriate for the kinds of educational interactions that are possible within this new technological environment.

In the following sections, the authors will first present the theoretical and methodological ideas behind a series of studies they conducted with colleagues at the Center for the Application of Information Technologies at Western Illinois University and at Arizona State University. One of the goals of these studies was to develop a conceptual framework to examine mediated interaction as the central theoretical construct in distance education. The theoretical assumptions of symbolic interactionism and the conceptual framework will be discussed in detail. The method followed for developing and refining the framework proposed here as well as results from these studies were reported and discussed in detail elsewhere (McIsaac, Blocher, Mahesh, & Vrasidas, 1999; Vrasidas, 1999; Vrasidas, 2001; Vrasidas, 2002; Vrasidas & McIsaac, 1999; Vrasidas & McIsaac, 2000; Vrasidas & Chamberlain, 2002). Findings from our research and the theoretical discussion will illustrate that old theories of distance education, such as the theory of transactional distance, are fundamentally flawed and need to be revisited in light of recent developments in the field.

JEROME BLUMER AND SYMBOLIC INTERACTIONISM

The studies from which the conceptual framework was derived and refined were based on the premises that Blumer (1969) advanced for *symbolic interactionism*. First, human beings act upon the world on the basis of the meanings that the world has for them. Second, the meaning of the world is socially constructed through one's interactions with members of the community. Third, the meaning of the world is processed again through interpretation. The traditional approach to research—which has dominated the field of distance education—tends to ignore the importance of meaning, interaction, and interpretation of the actors in shaping behavior. By employing interpretive methods, we attempted to understand the multiple layers of meaning represented by human actions and how they are interpreted by those involved.

Using a symbolic interactionist framework, interaction is defined as the reciprocal actions of two or more actors within a given context (Vrasidas,

1999). From a symbolic interactionist view, interaction is not a variable that one extracts from a broad context and examines on its own. Interaction is an ongoing process that resides in a context and also creates context. Most of the research conducted in the field of distance education employed quantitative approaches that used "context stripping" techniques in an attempt to control the influence of context on the findings of the study (Guba & Lincoln; 1998; Mishler, 1979). Such approaches attempted to examine interaction as a variable isolated from its context. However, context is crucial for the study of interaction. Context is provided by the history of the situation, past interaction sequences, and the anticipation of future interaction sequences. There is a reflexive relationship between context and interaction that prevents us from isolating the two. In order to examine human action and interaction, it is important to carefully study the context and the moment-to-moment events that lead to further interaction among people.

According to Blumer (1969), human beings are active, living organisms. It is important to note that interaction is interaction between actors and not factors. Social interaction is an ongoing process that shapes human conduct as actors fit their actions with one another and form a continuous flow of interaction. Participants have intentions that influence interaction. Meehl (1978), Cziko (1989), Vrasidas (2002), and others have argued that intentions and human consciousness are important factors often ignored in the study of education and other "soft sciences." Participants always take into account others' actions, and in light of those actions, they revise, abandon, replace, or follow their initial intention. Several of our reports have discussed in detail the nature and importance of participants' intentions and personal agendas in shaping interaction in distance education programs (Vrasidas & Chamberlain, 2002; Vrasidas & McIsaac, 1999; Vrasidas, 2002).

The conceptual framework proposed does not attempt to explain or describe every possible variable and relationship among variables in a distance education program. It rather provides a set of concepts that can be used to think about distance education. It can be used as a heuristic tool to examine relationships among concepts, study distance education programs, develop additional lines of research, and raise new questions. This framework is not only applicable to distance education, but also to the study of "hybrid" educational situations that use a combination of face-to-face and mediated interactions.

CONCEPTUAL FRAMEWORK

Interaction lies at the center of any learning experience (Dewey, 1938; Vygotsky, 1978), and it has been identified as one of the major constructs

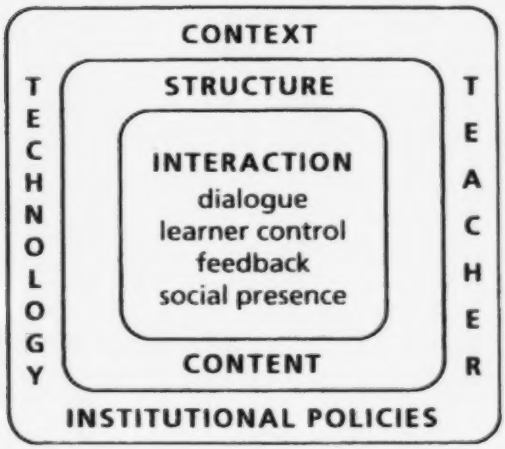

Figure 2.1. Conceptual framework for studying distance education.

in distance education research (McIsaac & Gunawardena, 1996; Moore, 1989; Vrasidas, 2000; Wagner, 1994). Dewey (1938) argued that education is based on the interaction of an individual's external and internal conditions. Interaction and the situation within which one experiences the world cannot be separated because the context of interaction is provided by the situation. He postulated that "an experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment..." (p. 43). The idea of transaction suggests the intersubjectivity between the individual him or herself, other people, and his or her surrounding environment.

Between 1997 and 2002, the authors and colleagues conducted a series of studies to examine face-to-face and mediated interaction in distance education courses. The results of those studies led to the construction and refinement of a conceptual framework (see Figure 2.1). The classic concept of "interaction" can now be seen as resolvable into a set of concepts embedded in a particular instructional structure that itself is embedded in a social/institutional context that mediates the salience of these concepts and the relationships among them. Figure 2.1 is an attempt to portray this framework. Modalities or qualities of interaction form the foreground (or "figure") emerging from the background (or "ground") of social and institutional context. Other researchers will reverse the figure-ground relationship as their interests dictate. But for us, it is the evolving nature of teacher-learner-content interactions shaped by technological advances considered in their social and institutional contexts that serves as the focus of our disciplined inquiries. The framework consists of the following categories: context (e.g., institutional policies, teacher, technology, content), structure, learner control, social presence, feedback, dialogue, and interaction. Teacher and technology are the two most important components of con-

text since they shape the structure of the learning environment in ways that will allow learners to construct knowledge and meaning alone and in collaboration with teachers and peers.

The major categories of the framework were fine-tuned by conducting a review of research in distance education (Baynton, 1992; Chen & Willits, 1999; Dille & Mezack, 1991; Gunawardena, 1995; Gunawardena & Zittle, 1997; Hillman, Willis, & Gunawardena, 1994; McHenry & Bozik, 1995; McIsaac & Gunawardena, 1996; Moore, 1994; Parker, 1995; Quinn, Mehan, Levin, & Black, 1983; Ross, 1996; Saba & Shearer, 1994). All categories of the framework are part of a system and are interrelated.

Context

Learning, knowledge, and human activity are situated in specific contexts (Brown, Collins, & Duguid, 1989; Suchman, 1987). As Dewey (1938) put it, "... experience does not occur in a vacuum" (p. 40). To examine a complex construct, such as interaction, researchers should carefully examine the context within which interaction takes place. The context of interaction in distance education consists, of institutional and departmental policies, technologies employed, the teacher, number of students enrolled in a program, and course content, among others. Policies and curricula will influence the teacher's selection of structure and the content of the course. The content of an online course is an important component of the context of interaction, and it influences the structure of the course. Some content lends itself to certain kinds of interactions and instructional approaches (Eastmond & Ziegahn, 1995; Jorgenson, Joshi, & Monroe, 1996; Moore, 1991).

Teachers' philosophies of education and their epistemological beliefs will be reflected in their approach to teaching and structure of the course. What strategies they employ, how enthusiastic they are about the subject matter, the nature of the learning tasks they select and organize, and their attitude about the mediating technology will also have an impact on interaction. The teacher will determine the nature of the structure, dialogue, and content in the course. The teacher can be an individual or a team of people working for the design and delivery of a distance education program. Even though such determinations can be made in collaboration with students, the teacher and/or the instructional design team play the leading role. Furthermore, teacher skills and competencies to teach at a distance are an important factor. Several studies have shown the multiple skills and duties carried out by teachers in distance education settings (Anderson, Rourke, Garrison, & Archer, 2001; Berge, 1995; Goodyear, Salmon, Spector, Steeples, & Tincker, 2000; Paulsen, 1995). Such roles can be construed

in social, pedagogical, and technical terms. The competencies of teachers are very important. For example, if teachers are not capable of using the technology effectively, they will not be able to model expert behavior for students nor help students who are having difficulties with the technology. Another important component of context is support provided to the teacher, which will influence interaction and the success of the program.

The technology that mediates interaction is important within this framework. Technologies used in distance education include books and other print material, broadcast television, video, audio, telephones, and computers. Various technologies allow for different cues to be communicated and different communication strategies. Print material used in correspondence education was limited in the kinds of interactions allowed and was more appropriate for one-way communication (Garrison, 1993). Affordances of telecommunication technologies (e.g., computer conferencing, interactive video, and audiographics) allow for two-way communication and interaction. The nature of these technologies and the role that educationists play in their development is a topic, often ignored, to which we return presently.

Affordance is a notion borrowed from Gibson's (1977, 1979) work, and it has been discussed by several scholars (Jonassen, Campbell, & Davidson, 1994; Norman, 1989, 1993; Pea, 1993). An affordance of a thing refers to the properties of the thing that allow it to be used in certain ways. For example, a chair affords sitting. Interactive television affords seeing and hearing students from miles away and interacting with them in real time. Telecommunications technologies afford synchronous and asynchronous interaction among multiple users. Computer conferencing and the Internet afford the design of learning environments that support the development of communities of inquiry, collaboration, negotiation, and problem solving within authentic contexts (Jonassen, in press; Vrasidas, 2000). Technologies in wide use at the time some distance education theories were proposed could not afford learner-learner interaction at a frequent rate and on a large scale. The affordances of new telecommunications technologies and personal computers require that we revisit fundamental assumptions about distance education pedagogy. What we know about pedagogy requires that the technological affordances of the future be driven in part by the needs of education, even as invention in the past was driven by the exigencies of business.

Take the microcomputer—the PC—as a case in point. Not since Samuel Pressey in the 1920s or Skinner's teaching machine of the 1950s—both inventions based on rather sterile conceptions of teaching and learning—has a technological innovation been designed by educationists or psychologists. Software development emanating strictly from educational interests has been similarly lacking (Papert's Logo dating back almost a half century

representing the rare exceptions). The needs of business and the economy have driven the development of technologies that are then adapted—often at great inconvenience—for educational purposes. The PC now stands at the center of technological affordances that mediate teaching-learning interactions and yet the PC is only slightly less than utterly lacking in its ability to improve teaching. Because the PC can do "anything," it requires a great deal of configuring and maintaining to do any one particular thing, like teaching (Norman, 1999). The present use of the PC in teaching is not unlike selling a customer a new automobile equipped with a few hundred microprocessors, each of which must be configured and programmed before the key is placed in the ignition and the car engine is started. The intricacies and frustrations of using PCs as instructional aides still, in the early 21st century, vitiate their contribution to education. Ask any teacher.

Interaction in Distance Education

Four types of interaction were identified in distance education literature: learner-content, learner-teacher, learner-learner, and learner-interface (Hillman et al., 1994; Moore, 1989). Learner-content interaction is the fundamental form of interaction on which all education is based. Learning will occur when learners interact with some content. Content is found, among other places, in books, objects from the environment, abstract ideas, problems to be solved, videotapes, computer programs, and websites. The learner-teacher interaction can take the form of the teacher delivering instruction, lecturing, and providing support, encouragement, and feedback to learners. The learner might be interacting with the instructor by asking questions, submitting homework, and discussing a problem. The learner-learner/peers interaction takes place when learners collaborate with peers on projects and discuss ideas.

For any of the three types of interaction to take place (learner-teacher, learner-content, learner-peers), the learner has to interact with the technology (see Figure 2.2). Hillman et al. (1994) who discussed in detail the importance of learner-technology interaction in distance education based their argument on Salomon's (1974, 1994) symbol attributes theory according to which each medium employs different symbol systems to convey a message. The message conveyed is colored by the medium's attributes. The learner needs to be able to comprehend the message coming from that medium. Communication will be successful when both the sender and receiver of a message are confident in coding and decoding messages transmitted via that medium. Therefore, learners' skills to engage in technology-mediated communication are important factors that will influence success in distance education. Figure 2.2 is an attempt to illustrate the importance

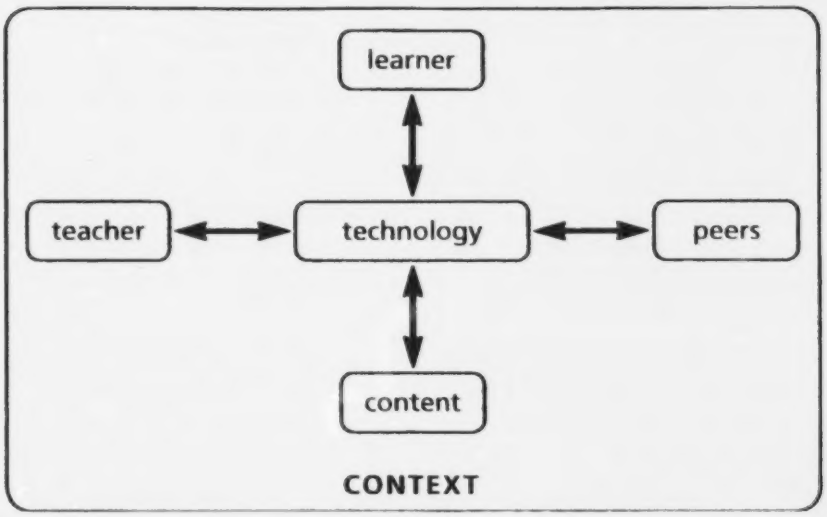

Figure 2.2. Technology-mediated interaction among teacher, learner, peers, and content.

of technology in mediating and shaping interaction among learner, peers, teacher, and content. In addition, teacher-interface interaction is rarely examined or discussed in distance education literature. However, problems of teacher-interface may have more to do with the success or failure of distance education than any other kind of interaction. Furthermore, the interface may not be simply a "medium" but may be content in its own right. Just as McLuhan argued that "the medium is the message," in the age of cheap, personal telecommunications, the medium may become an essential part of the content.

Research in distance education has examined teacher-learner and learner-learner interaction mediated by a variety of media, such as print, audio conferencing, interactive video, and computer networks (Garrison, 1990; Harasim, 2002; Kiesler, Siegel, & McGuire, 1984; McHenry & Bozik, 1995; Pierre & Olsen, 1991; Ross, 1996). From a Human-Computer Interaction (HCI) perspective, the experience of the user when interacting with the interface is important for successful integration of computers in education and the workplace (Norman, 1989, 1993, 1999; Raskin, 2000; Shneiderman, 1998). For educational applications developed online, usability is the degree to which the learner can effectively and efficiently complete activities and engage in technology-mediated interaction with content, tools, teacher, and peers. Most technology has been developed for the business world and not for educational uses. Norman (1999) argued that we are trapped in a complex world that was created by technologists for technologists and that "we have even been told that 'being digital' is a virtue. But it isn't: People are analog, not digital; biological, not mechanical" (p.

viii). Educators and instructional technologists have not caught up with research on the importance of usability of technologies and tools for teaching and learning.

Several studies were conducted to examine the learner-interface interaction and the impact of technology on communication, but few studies examined the impact of usability on learning. Tselios, Avouris, Dimitracopoulou, and Daskalaki (2001) evaluated the usability of an online learning environment and examined the impact of usability on student performance. They compared the usability of the Infotronic Distance Learning Environment (IDLE) and WEBCT. IDLE is an online environment developed to support engineering students studying electronics and computer topics at the University of Patras, Greece. WEBCT is a commercial tool for designing and offering online classes. The authors found a positive correlation between the usability of the systems used in the study and students' performance and concluded that usability "influenced considerably the education process" (p. 26).

Comeaux (1995) examined the impact of an interactive network on classroom communication and learning. She found that awareness of technology, such as microphones and cameras, hampered interaction. Jorgenson et al. (1996) examined interaction among learners at the remote sites of a televised course. They found that students were reluctant to participate in cross-site interaction, but they did participate in interaction among peers in the individual remote sites.

Vrasidas and McIsaac (1999) found that students who were new to technology and computer-mediated interaction were uncomfortable participating in online synchronous chats. They felt more comfortable with the asynchronous communication because they could take the time to think and reflect on their ideas and message postings. The data also indicated that the computer filters interaction and requires a new set of technological and discourse skills for effective participation in online environments.

McHenry and Bozik (1995) conducted a study to examine the nature of interaction between teacher-learner and learner-learner in a live distance education course delivered via interactive video. The findings indicated that some students felt alienated because of technology, whereas others found it very exciting. Fulford and Zhang (1993) examined the relationship between perceived interaction and overall satisfaction with a course delivered via interactive television. Their results showed that perceived overall interaction in the course was highly correlated with overall satisfaction with the course.

Black, Levin, Mehan, and Quinn (1983) conducted a study to compare face-to-face and online discussions. They found that online discussions had multiple threads, were slower, and had longer delays between the exchange of two messages. In addition, the backchanneling associated with

face-to-face interaction was minimal in the online environment. "Back-channeling" refers to the process during which participants constantly reinforce each others' contribution in a conversation with simple gestures such as eye contact, head nodding, and short verbal exchanges such as "yeah" and "uhuh" (Duncan, 1972). While explaining the differences between face-to-face and online interactions, Black et al. (1983) argued that "the differences in interaction could be due to the lack of nonverbal cues, the use of the written word, the use of typing, the temporal delay between messages, the spatial separation of participants, or the number of participants in these interactions" (p. 66–67). Such findings are in agreement with recent studies that showed that online interaction is slower and lacks continuity, richness in cues communicated, and immediacy as compared with face-to-face interaction (Vrasidas, 1999; Vrasidas & Chamberlain, 2002).

Learner Control

Garrison and Baynton (1987) argued that the concept of control consists of three major components: independence, power, and support. Therefore, control should be examined as the resultant vector from these three factors. Independence is defined as the degree to which the learner is free to make choices. Power refers to the abilities and competencies of the learner to engage in a learning experience. Support refers to the resources available that will enable the learner to successfully participate in a distance education program. In a later study, Baynton (1992) found that there are other factors that might influence control such as institutional context, administrative policies, course design, and economic issues.

Studies showed that certain learner characteristics are more likely to be identified in successful distance learners (Dille & Mezack, 1991; Gibson, 1990; Hiltz, 1990). Such characteristics include internal locus of control, self-motivation, and independence. Those learners who perceive their accomplishments as being the result of their own efforts have an internal locus of control and are more likely to be successful as distance learners (McIsaac & Gunawardena, 1996). Parker (1995) conducted a study to examine the degree to which locus of control, financial support, and number of previously attended distance education courses could predict course completion among college student populations. She found that learners who have an external locus of control are more likely to drop out than learners with an internal locus of control. Of course, this turns around an old finding of social psychology that people experiencing success—for whatever reason—attribute the success to their own actions. Does "internal locus of control" promote successful learning, or does successful learning

promote a sense of internal locus of control? There is hardly any research that unravels this ambiguity.

Learners' ability to participate in an online course is an important factor that determines the degree to which they will engage in interaction with the instructor and peers. In order to interact with the instructor, the content, and peers in an online course, the learner must have the necessary technology and computer communication skills (Ellsworth, 1996; Vrasidas & McIsaac, 1999). Ross (1996) found that when learners do not have the skills to communicate using computers, they are more aware of technology rather than the content of communication during interaction. In addition, students who are self-motivated and provided with the resources to use technology are more likely to engage in interaction.

Social Presence

The term "social presence" was derived from research in the field of the social psychology of telecommunications. Short, Williams, and Christie (1976) coined and originally defined the term "social presence as a quality of the medium itself" (p. 65). Different media engender different degrees of social presence. Social presence is the degree to which a medium allows the user to feel socially present in a mediated situation. It is hypothesized that the more cues transmitted by a medium, the more social presence characterizes the medium. Therefore, media such as interactive video and multimedia computer conferencing carry with them the potential for higher degrees of social presence than text-based computer-conferencing systems.

Gunawardena (1995) studied the construct of social presence and its implications for text-based computer-mediated communication (CMC). She examined whether social presence is a characteristic of the medium itself or if it is an attribute of the user's perception of the medium. The findings of her study showed that social presence can be promoted in a CMC setting by employing strategies that encourage interaction. In addition, she found that the lack of audio-visual cues led CMC users to invent other means for compensating for the lack of those cues. These findings are in agreement with other studies that show that the temporal, spatial, and contextual limitations of online interaction lead to the development of strategies that compensate for the lack of visual and aural cues present in face-to-face interaction (Gunawardena & Zittle, 1997; Rezabek & Gochenour, 1998; Vrasidas & Chamberlain, 2002; Vrasidas & McIsaac, 1999; Werry, 1996). Such strategies include the use of capitalization, abbreviating the message, and the use of emoticons (e.g., :-)).

It is unclear whether heightened social presence is always to be sought after. Some persons may find the "face-to-face ideal" interaction too anxiety

provoking and may function better in an environment that puts more distance between teacher and learner. It is often assumed that immediate interactions are preferred. Burbules (2000) argued that "it is a myth to imagine that more immediate interactions are always the most honest, open, and intimate ones" (p. 329). Some learners feel more comfortable and less emotionally intimidated interacting with teacher and peers by not being physically present (Burbules & Callister, 2000; McIsaac & Gunawardena, 1996). An area that seems promising for research is the role of emotions in online interaction and social presence. In the past 15 years, there has been an outpouring of research on the role of emotions in several disciplines such as philosophy, sociology, psychology, history, and anthropology (Zembylas, in press). There is a renewed interest in the emotions of teaching, the emotional politics of teacher development and educational reform, and the implications for teacher education (Boler, 1999; Hargreaves, 1998a, 1998b, 2000; Lasky, 2000; Nias, 1996; Schmidt, 2000; Zembylas, 2002). The role of emotions in cyberspace and online learning is a new and exciting research area, since information technology is producing new emotional self-stories that influence social presence; stories that might not otherwise be told, as emotion is part of each interaction.

Feedback

Feedback has been associated with kinds of responses that provide information to students about the correctness of their assignments, homework, or class contributions (Mory, 1996). Feedback in distance education is more important than just a mechanism for informing the student on how well he or she did on an assignment. In face-to-face situations, nonverbal gestures are constantly exchanged, providing both the teacher and learners with feedback. A verbal comment by the teacher, a smile, a facial expression, and a gesture are all ways in which students can receive feedback on their work and ideas. A confused look can indicate to the teacher that he or she needs to elaborate on a topic or drop it.

Studies we conducted indicated that the lack of immediate feedback in online classes contributed to the feeling of isolation among students (Vrasidas & McIsaac, 1999; Vrasidas, 2002; Vrasidas & Chamberlain, 2002). Stevenson, Sander, and Nayor (1996) found that one of the most important elements promoting learner satisfaction in a course was timely and encouraging feedback on assignments. Several other researchers (Gunawardena, 1995; Roman, 1997; Wagner & McCombs, 1995) supported the importance of feedback in distance education.

Dialogue and Structure: Transactional Distance Theory

Moore proposed the theory of transactional distance, which was "intended to be global and descriptive. ... it was to be of sufficient generality to accommodate all forms of distance education, and to provide a conceptual tool that would help students and others to place any distance education program in relationship to any other" (Moore & Kearsley, 1996, p. 199). Moore (1991) postulated that transactional distance is the psychological and communication gap that results from the geographical separation between learners and teacher. He argued that transactional distance exists in all kinds of educational programs even those offered face-to-face. The constructs that influence transactional distance are learner autonomy, structure, and dialogue. Structure refers to the overall design of the course. Dialogue refers to the learner-teacher interaction. A program is effective when it provides sufficient dialogue opportunities between learner and teacher and enough structure that provides guidance to students. The hypotheses behind this theory are:

- The greater the distance, the more learner autonomy the learner has to exercise for learning to occur.
- As structure increases, dialogue decreases, and transactional distance increases.
- As dialogue increases, structure decreases, and transactional distance decreases.

Saba and Shèarer (1994) conducted a study to verify empirically the concepts of transactional distance, dialogue, and structure. They defined dialogue as the "extent of verbal interaction between the educator and learner" (p. 42). Their study was based on a causal interpretation of the construct of transactional distance. Their approach derived from a model based on Saba's (1988) earlier work on systems dynamics used in biological and industrial settings. The model used variables such as management, development of instructional material, student attrition, and available resources to simulate the complex relationships among such variables in distance education organizations. Saba and Shearer (1994) constructed a model based on mathematical formulas that would predict the amount of transactional distance depending on variables such as learner control, teacher control, dialogue, and structure. The results indicated that transactional distance depends on the rate of dialogue and structure and confirmed Moore's theory. Other researchers, such as Bischoff, Bisconer, Kooker, and Woods (1996), also examined transactional distance by defining dialogue as the communication between teacher and students.

DISCUSSION

Defining dialogue as teacher-learner interaction fails to capture the reciprocal nature and importance of mediated interaction as a central concept in distance education. Additional kinds of interaction that take place in distance education programs including learner-learner, learner-interface, and group interactions should also be addressed (Chen, 2001; Chen & Willits, 1999; Cookson & Chang, 1995; Vrasidas & McIsaac, 1999). Careful examination of the data and the interactions identified in the research we conducted at Arizona State University and the Center for the Application of Information Technologies at Western Illinois University indicated that structure influenced dialogue and interaction and that structure is not static but dynamic, constantly negotiated during the course of the semester (Vrasidas, 2002; Vrasidas, 1999; Vrasidas & McIsaac, 1999, Vrasidas & McIsaac, 2000). Elements of structure, such as required activities, led to more interactions and increased dialogue among participants. Several of the interactions identified in distance education programs are part of class requirements and part of structure. For example, participation in and moderation of discussions and collaboration on projects are often required. Such activities increase interaction and dialogue among participants. Consequently, increased structure can lead to more dialogue and interaction. Such findings are in contradiction to the hypothesis that increasing structure decreases dialogue and increases transactional distance (Moore 1991; Saba & Shearer, 1994). The development of more seamless conferencing systems in recent years has eliminated some of the earlier restrictions that technology placed on the structure-dialogue balance. Current conferencing systems allow synchronous chats and asynchronous threaded discussions that were not common previously.

Saba and Shearer (1994) did not take into account the reciprocal nature of interaction and the importance of context. The model they developed attempted to predict human behavior and the levels of transactional distance in a computer simulation and confirmed Moore's theory. However, we argue that the essence of a learning environment cannot be summed up in a list of "if-then" statements, often found in computer simulations. Moore's (1991) theory and Saba and Shearer's (1994) study are perfect examples of Meehl's (1978) "soft theories" that are un-falsifiable and uninformative.

Meehl (1978) argued that the "soft sciences" (e.g., educational psychology) are not based on the same premises that theories of the "hard sciences" (e.g., physics) are based and do not advance in a similar manner. Meehl raised serious doubts regarding the "scientific nature" of the soft sciences and argued that most theories in the soft sciences "are scientifically unimpressive and technologically worthless" and they "lack the cumulative

character of scientific knowledge" (p. 806). Furthermore, he argued that soft theories "tend neither to be refuted nor corroborated, but instead merely fade away as people lose interest" (p. 806). Usually, the null hypothesis stated at the planning stages of a study, is rejected, thus leading to the confirmation of the theory on which the study was based. But as Popper argued, and Meehl concurred, theories can only be refuted, not confirmed; and a theory that is not falsifiable is not informative. He also argued that the extensive use of significance testing in psychology is a "poor way of doing science" (p. 806). Glass (2000) agreed with Meehl and argued that we, as educational researchers, "need to stop thinking of ourselves as scientists testing grand theories, and face the fact that we are technicians collecting and collating information, often in quantitative forms." Meehl, according to Glass (2000),

> ... dispelled once and for all the misconception that we in, what he called, the "soft social sciences" are testing theories in any way even remotely resembling how theory focuses and advances research in the hard sciences. Indeed, the mistaken notion that we are theory driven has, in Meehl's opinion, led us into a worthless pro forma ritual of testing and rejecting statistical hypotheses that are a priori known to be 99% false before they are tested.

Discussions of research in distance education often focus on the need for theory (Garrison, 2000; Moore, 1991; Saba, 2000; Simonson, Schlosser, Hanson, 1999), the need for defining variables in "operational" terms, and the need for using systems methods to capture the complexities and myriads of variables interacting in education settings (Saba, 1988; Saba & Shearer, 1994). Cziko (1989), in discussing the complex nature of human behavior and the constantly changing interacting factors that influence it, cited the work of Cronbach and Snow who concluded that "comprehensive and definite experiments in the social sciences are not possible and that the most we can ever realistically hope to achieve in educational research is not prediction and control but rather only temporary understanding" (p. 17). Similar to research findings in traditional classroom settings (Mehan, 1979, 1980), our work has shown that in distance education programs, students' and teachers' interactions are often unpredictable since they are driven by their intentions and private agendas (Vrasidas, 1999, 2002).

Educational researchers can contribute more to the improvement of teaching and learning by focusing on understanding and explaining educational phenomena, rather than attempting to formulate grand theories to control and predict human behavior, which is by nature unpredictable and indeterministic. As Cziko (1989) argued, "even if we do inhabit a completely deterministic universe, there are nonetheless compelling reasons to believe that it is impossible to make accurate, nontrivial predictions concerning human behavior" (p. 17). Theories of distance education that

attempt to predict and control human behavior, as formulated and verified by the "scientific method" and excessive significant testing, should not constitute the mainstream of our research. What the field needs is frameworks and models that attempt to describe, explain, and help us understand the complexities of learning at a distance when interactions are heavily mediated by technology.

Given the context of contemporary distance education's practice, we respectfully propose that transactional distance theory is fundamentally flawed for the following reasons:

1. The research on which the theory is based was conducted during times when most distance education was based on prepackaged material and correspondence education. Although such approaches are still used today, they are by no means sufficient in conceptualizing the contemporary field.
2. Transactional distance was conceived as the distance between teacher and learners, ignoring "distance" between learner-learner, learner-content, and learner-interface. Group interactions and learner-interface interactions are essential for learning in today's networked classrooms.
3. Structure does not necessarily reduce dialogue. A distance education program can be structured so that dialogue is promoted. Furthermore, structure is not a two-dimensional characteristic (high or low) but much more complex. Structure, like dialogue, is dynamic, constantly changing, and is constructed and socially negotiated during a course of study.
4. Old definitions of theories do not account for the affordances of new technologies. Recent developments in computer conferencing allow for more learner-learner and group interactions. Moore (1989) has acknowledged that learner-learner interaction is "a challenge to our thinking and practice in the 1990s" (p. 4). However, his theory does not represent a response to this challenge. Learner-learner, learner-content, and learner-interface interactions are important and should be included in any attempt to study dialogue in a distance education program.
5. Research methods employed in studying distance education ignored the reciprocal nature of technology-mediated interaction and its importance for teaching and learning.
6. "Distance" cannot be the defining characteristic of the field. We need to move away from distance, geographical or psychological, and focus our inquiry on those pedagogical intentional interactions mediated by technology and constructed by learners, teachers, and tutors while designing and participating in distance education programs.

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The conceptual framework discussed in this chapter can be used to:

- Describe and classify distance education programs.
- Help educators, policy makers, developers, and administrators better understand what influences students, teachers, and distance education programs.
- Study distance education programs and how the various categories included in the framework influence each other and student learning.
- Examine the importance of technology affordances for the design of successful online learning environments.
- Ask questions about possible relationships among constructs in distance education courses as well as hybrid courses offered via a variety of technologies.

CONCLUSION

Scholars of "distance education" quickly acknowledged that "distance" itself is not the defining feature of their field. When distance education researchers attempted to salvage the concept of "distance" through the use of a concept like "transactional distance," all that was gained for the effort was a couple of uninteresting studies that illustrated Meehl's (1978) "soft psychology" at its worst. Considering the irrelevance of "distance" per se in the examination of technologically mediated instruction, there is an ironic absence in distance education research of attention to technology and how it shapes learners, teachers, content, interaction, collaboration, and knowledge construction. Moving technology to the center of our concern raises the visibility of a set of research questions that have been seriously deemphasized (see Figure 2.2). Such a move should not suggest that technology is more important than the learner and the learning processes, but that focusing on technology and studying the ways in which technology affordances shape interaction among learners-teacher-content will also help us understand how technology-mediated interaction influences social presence, structure, learner control, and feedback. Technology should not be studied in isolation nor as a "mere vehicle" (Clark, 1983, 1994), but within the context and structure of a program in order to examine how the synergy of technology, instructional methods, subject matter, and other contextual factors provide the conditions necessary to support knowledge construction and learning when teachers and learners are separated (Jonassen et al., 1994; Kozma, 1991, 1994; Salomon, Perkins, & Globerson, 1991). Examples of questions that can be asked include the following:

- How do technology affordances permit and constrain certain kinds of interactions?

- What does it mean to be a teacher and learner in today's heavily technology-mediated educational environments?
- How does technology-mediated interaction shape structure, learning, learner control, and social presence?
- What technologies can be used to undertake the kinds of tasks that learners cannot easily perform (e.g., store and retrieve information, execute advanced calculations) and allocate learners the tasks they do best?
- How has technology made some content obsolete and other content more important than ever? What content should be relegated to machines instead of taught to humans?
- What combination of technologies, content, context, and instructional methods are appropriate for what kinds of instructional goals, teachers, and learners?
- How is emotion communicated online, and how do technological affordances shape emotional rules?
- Based on what affordances are appropriate for what kinds of learning, what technologies can be invented/developed for particular use in education?

The above list of questions is not exhaustive but it is illustrative of the wide range of questions that can be asked and issues to be addressed in the field. These questions about technology-mediated instruction currently receive too little attention in distance education. This may be because they are fundamentally technical and academics ignore them because they operate under the belief that theory is somehow superior to technology or perhaps because there is a long tradition of media-learning research and discussion of whether technology influences learning, which led to irresolvable debates (Clark, 1983, 1994; Jonassen et al., 1994; Kozma, 1991, 1994). Educators tend to theorize and psychologize about everything failing to focus on practical and tangible things that can improve teaching and learning.

What education needs is machines specifically designed for the task of teaching particular understandings or skills, machines that "out of the box" engage teacher and learner in the content of instruction, even as that ancient invention, the book, now does so. Such machines will have to be designed by educationists, educational psychologists, and others who understand young learners and their needs; and they will have to be built by engineers. Consider a concrete example. Each year, teachers edit and give feedback to students (from sixth graders to graduate students) on hundreds of millions of written compositions. Anyone who has acted as the editor in this situation—and virtually anyone reading these words has—knows well the shortcomings of PC-based word processors in this role. Aside from "track changes" tools embedded in large multi-purpose word

processors, there are no affordances that make the editing of compositions convenient and natural to the editor and helpful to the student. Editors working on paper always strikeout, circle, and use arrows (to indicate moving text) extensively in giving feedback. The first action is clumsy, and the second and third are not even possible with current "track changes" tools. The nearest thing to a true representation of typical editing would be for the editor to print the composition, mark it up with pen and ink, scan the edited pages, and then transfer images to the student. The needs of business for this type of editing are not sufficiently pressing nor profitable to have spawned any inventions in this area, and yet teachers and their students would benefit greatly from such an invention.

Even though studies in distance education examined the impact of technology on teachers and learners, the focus of such studies was on skills of users rather than on how technology affords certain kinds of interactions and shapes content, context, interaction, and learner experience. What we argue is that researchers examine the ways that technologies can facilitate teaching and learning and conduct research that can point the way to improved development of such technologies. The most influential technologies now available were not invented to teach nor to be used in educational settings. Educators rush to adopt technologies that were never developed with teachers and students in mind but were developed primarily for the business world. Such technologies have been driven largely by the needs of businesses to sell products. Educational technologists should engage in research and development in partnership with business industries to identify and capitalize on those technology affordances that can improve teaching and learning.

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CHAPTER 3

RETHINKING ASSESSMENT FOR THE ONLINE ENVIRONMENT

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ABSTRACT

This chapter argues that distance educators need to rethink assessment practices in the light of the benefits and problems encountered in the online context. It looks at the fundamentals of assessment that need to be carried over from traditional approaches and then analyzes the attributes of the online environment that can be used to rethink the process. It also reviews examples of innovative assessment strategies and identifies a set of principles of good practice in online assessment.

INTRODUCTION

Networked technologies are changing the nature of higher education, both for campus and distance learners, not only in the methods of delivery, but also in the content and skills being taught. On the whole, however,

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assessment strategies have not kept pace with the changes—both positive and negative—that online learning is precipitating. In order for the benefits of these changes to be fully realized in improved learning outcomes, it is essential that assessment be rethought for the new environment that communication technology has helped to create.

While many educators are convinced of the potential benefits of the online environment, it would be unwise to ignore the new problems created by the ease of access to vast amounts of electronic data. In relation to assessment, one of these problems is plagiarism, which has taken on new forms and is undermining traditional coping strategies. Another issue arises with the spread of global education, which communication technology encourages: how do you know that the student who carries out an online assignment is the student whom you eventually accredit?

It is not a coincidence that the dominant pedagogy (in the West at least), centers on the value of interactivity, of collaborative learning, and of active engagement with the learning material. All of these values are strongly supported in the online environment by the multimedia and communication potential of the Web; however, most traditional forms of assessment (individual essays, multiple-choice questions, and invigilated examinations) are not very appropriate for testing the skills and learning outcomes that online courses are promoting. Consequently, students are reporting a mismatch between the values of the course pedagogy and the demands of the assessment.

The Web has spawned a whole new generation of multiple-choice testing software that offers benefits to academics teaching larger and larger classes in the form of relief from the burden of marking each test by hand and to students in terms of greater opportunity for feedback. At the other end of the assessment spectrum, the resource and communications potential of the Web has facilitated a whole range of collaborative, interactive, and student-centered forms of assessment, which offer real learning opportunities for students.

This chapter makes a case for rethinking assessment practices in the light of the benefits and problems encountered in the online context. It looks at the fundamentals of assessment that need to be carried over from traditional assessment strategies and then analyses the attributes of the online environment that can be used to rethink the process. It also reviews examples of innovatory assessment strategies in order to identify a set of principles of good practice in online assessment.

WHAT IS ASSESSMENT?

Assessment is an evaluation or appraisal; it is about making a judgment and inevitably involves an element of subjectivity by the assessor. For example, the very choice of assessment method by the course designer—whether oral or written, whether essay or multiple choice, whether individual or collaborative—involves a judgment that advantages some students over others before they have even registered to study the course!

Assessment plays a crucial role in the education process; in fact, for many students, it defines the curriculum of the course. It determines much of the work they undertake. It affects their approach to learning, and it is regarded as enshrining the values the course aims to instill.

From the instructor's point of view, the purpose of assessment is varied: it helps to motivate students and pace their work throughout the course; it can create learning opportunities through being linked to activities, collaborative work, and extended projects; it provides a major focus for individual feedback to students, which is especially effective when iterative assignments are set; finally, it is used to grade and ultimately to accredit students and thus is bound up with the quality assurance procedures of the course. Some assessment experts claim that instructors frequently confuse these varied functions, or at least try to make every assignment do all of them (e.g., Rust, 2001). Most call for a reduction of the grading and assessing functions and more emphasis on feedback, self assessment, and integration of activity with assessment.

LEARNING THROUGH ASSESSMENT

The Holy Grail of best practice is to design assessment strategies that empower students rather than discourage them. Over-testing, providing no feedback, memory-based exams, and lack of transparency in the question and the marking scheme are all practices that lead to resentment, surface learning, and poor learning outcomes. Many authors have defined the basic attributes of good assessment (e.g., Biggs, 1999; Brown, Race, & Smith, 1996; Ramsden, 1992):

- Assessment should be a vehicle for educational improvement.
- It should be explicit in values, aims, criteria, and standards.
- It should be relevant, authentic, and holistic.
- It should be reliable, valid, and consistent while also being flexible enough to cater to diverse learning styles and needs.

It has been argued (Boud, 2000) that traditional assessment fails to provide opportunities for students to learn the very thing they most need to

know: how to assess their own learning. One of the aims of higher education must surely be to prepare students for an increasingly unknowable future. Undergraduates and lifelong learners alike are increasingly realizing that they must take responsibility for remaining employable. There is a need for programs in which students reach not just immediate course-related goals but much wider learning and self-development goals.

Existing assessment practices frequently disempower learners and put the control and the judgement of learning in the hands of the assessors and tutors. For a learning society, it is the individual student who needs to develop the skills to assess his or her own and others' materials, to make judgements about quality and value, to give and receive feedback. One of the most significant tasks of the tutor is to help students develop these lifelong learning skills.

The trap in all assessment activities, however, is to fragment and compartmentalize knowledge and understanding for the sake of having a manageable process that fits the time and process constraints of common assessment methods. As a result, many existing assessment practices have effects that actually contradict lifelong learning outcomes. If developing lifelong learners is a core objective of higher education, the assessment processes need to be re-thought and re-positioned at the heart of the learning environment.

Examples of a lifelong learning approach to assessment include the following:

- Feedback loops in which students have the opportunity to apply the results of tutor feedback on their assignments to show improved performance.
- Group assignments in which students have opportunities to develop team-working skills.
- Opportunities for students to engage in the construction and reconstruction of criteria for judging work.
- Practice in discernment to identify critical aspects of problems and issues.
- Opportunities for students to comment on other students' work as well as to assess their own work.

There are a number of hurdles to overcome in re-positioning assessment at the forefront of the course design process. One of these is the conservative attitude (and current workload) of instructors. The other is institutional policies, standards, and practicalities in managing and resourcing assessment processes.

Angelo (1999) focuses on the need for a culture change among academics, course designers, and students—to value self-examination, reflection, and continuous improvement. It is commonly acknowledged that most aca-

demics receive little reward or compensation for devoting extra time to the design and development of online courses. Likewise, strategic learners will often avoid a course that has a reputation for being hard work. These factors make the re-thinking of assessment a challenging undertaking.

THE PRACTICALITIES OF ASSESSMENT

While improving student learning should be the main aim of assessment, there are a range of other considerations that constrain this in practice. In fact, it is useful to think of a triangle of interdependent factors:

- Quality assurance procedures.
- Resources for marking, giving feedback, providing reliability, and objectivity.
- Providing the learner with an opportunity for learning and for demonstrating the full range of skills, understanding, and knowledge gained on the course.

Keeping these three elements in equilibrium is a difficult balancing act at the best of times, and the online environment has changed aspects of all three elements, thus upsetting the existing balance. For example, web-based multiple-choice assignments are rated highly on the issues of reliability, objectivity, and ease of marking and also on some aspects of quality assurance; however, they are rated relatively poorly on the issue of providing learners with flexible opportunities to demonstrate their understanding. At the other extreme, negotiated learning contracts with individual students provide outstanding opportunities for learning through assessment, and the resources on the Web make this approach feasible for distance and remote students. However, they are costly in terms of human resources to mark and to quality assure and are much less objective than web-based assessments.

Each method of assessment advantages certain students over others. Some learners are much better at studying for and taking multiple-choice examinations; others are better at writing essays. Some have the skills to explore open-ended questions; others are more comfortable with short "right answer" questions. In terms of equity to students and of opportunities to examine all aspects of the course material, best practice in assessment usually dictates a range of assessment methods on each course as ideal.

THE ONLINE ENVIRONMENT

The Web offers a variety of facilities for education, which together have been said to constitute a new paradigm for learning (Harasim, Hiltz, Teles, & Turoff, 1995). These facilities can be amalgamated into the following four categories:

1. Multi-way communication among learners and between learners and experts.
2. Hypertextual rather than linear presentation of material.
3. Integrated access to resources both inside and outside the learning package.
4. Multimedia forms of interaction and presentation of material.

While there are databases listing thousands of online courses, few of these use all four potential facilities. Many courses concentrate on the communication possibilities, focusing on peer learning opportunities and interaction with the instructor or tutor. The content of the course may be delivered by print-based material, lectures, or even videoconference. Other courses—especially those in training and vocational subjects—focus on online content, exploiting the graphical and other multimedia attributes of the Web to deliver interactive teaching material with little or no interaction with other learners or tutors. Many courses provide an extensive website of resources (e.g., handouts, links to other sites, and to online papers) as a supplement and first step into the online environment. One of the reasons for the phenomenal growth of educational use of the Web is precisely this flexibility, this support for a wide range of contexts. The same flexibility also applies to the variety of online assessment possibilities that the Web currently offers.

FORMS OF ONLINE ASSESSMENT

It is rather too early in the development of online assessment strategies to be defining taxonomies of ways in which the Web can be used for assessment. However, some categorization is possible. In particular, there is a clear divide between what is usually called "web-based assessment" (or sometimes computer-aided assessment), that is, various forms of multiple-choice questions delivered via the Web and what is very loosely called online assessment, which usually refers to all those practices that involve Web resources and/or communication with fellow learners. The pedagogy underlying these two categories is quite different: web-based assessment tends to be used in disciplines with a scientific or numeric basis, and online

assessment tends to be used in areas of soft skills requiring analysis, reflection, team work, or research.

Another category of online assessment is the growing practice of electronic handling of assignments, particularly in distance teaching universities or units (see van Gorp & Boysen, 1997). This involves any or all of the following:

- Electronic submission of assignments by the student.
- Electronic marking of assignments by the tutor.
- Electronic retrieval of marks by the student.

While there are a number of benefits of this practice in terms of ease of access and faster turn-around times, the most significant implication is that it opens up the way for innovative online forms of assessment, such as websites. While many forms of online assessment are simple copies of practices common in traditional, face-to-face teaching environments, others build on the unique properties of the Web. Examples copied from traditional environments include the following:

- Assessment in the form of portfolios of work.
- Research and critical review of resources.
- Computer-marked quizzes.
- Reflective journals.
- Negotiated learning contracts.

All these have direct online equivalents, though they can be enhanced and improved through Web delivery. Examples that have arisen because of the unique properties of the Web include the following:

- Online debates.
- Group discussions, which form the basis of either individual or group assignments.
- Individual and collaboratively produced websites.
- Peer commenting on assignments.
- Repositories of student assignments for consulting and reuse.

Although online assessment has advantages even for campus-based students, it is distance learners who enjoy particular benefits: collaborative assignments, digital repositories, access to vast resources, iterative assignments, and multimedia assignments. While none of these were impossible without the Web, they were so awkward and difficult to administer that they were rarely used.

Web-Based Assessment

Web-based assessment offers much more scope for comprehensive testing of course objectives and student understanding than the old multiple-choice systems (Brown, Race, & Bull, 1999). Examples include fill-in-the-blanks, matching questions, multiple correct answers, graphical hotspots, ranking, sequencing, assertion-reason, and so on. They are demanding and expensive to develop, but they are cost-effective with large student numbers and are particularly appropriate for a multi-national student body. They are easy to quality assure, to deliver, and to mark and record. They require little input from tutors.

The literature on web-based assessment, the software and support tools, and the availability of case studies from which to discover the pitfalls are more extensive than the equivalent in the much broader category of online assessment. Software vendors maintain sites full of useful tips, case studies, and practice sessions (e.g., http://www.questionmark.com/, http://www.i-assess.co.uk). Conferences on web-based assessment have websites with full text papers (e.g.,

http://www.lboro.ac.uk/service/ltd/flicaa/conf2001/pdfs/, http://www.autc.gov.au/forum/papers.htm). Portals on the practice of web-based assessment are also a rich source of resources, tools, papers and FAQs (e.g., http://www.caacentre.ac.uk/).

From these and other sources, it is possible to draw a number of conclusions. First of all, students are generally positive about this type of assessment because of:

- The immediate feedback and grading (if applicable).
- The convenience and flexibility for part-time and distance students.
- The clarity and objectivity of the procedures.
- The fact that they are less demanding than other forms of assessment.

There is, however, growing evidence that the most useful application of web-based assessment is for formative and self-assessment strategies rather than summative and graded assessment. Innovative practitioners are beginning to regard web-based assessment as part of the learning process, by building in extensive feedback and opportunities to go back and re-do the tests, especially as a revision exercise and as an integrated activity with simulations and other interactive teaching materials.

A further benefit was noted by one adult distance teaching application:

> Our discussions with some of the non-native English speakers in the class and our observations of the performance of these students indicated that this group might have especially benefited from the web-based assessment

> regime employed in this module. Informal survey of these students indicated that most found it easier to express their knowledge within this assessment strategy than by writing essay responses to exam questions, the norm in many of our courses. In addition, we noticed that a number of these students showed substantial improvements in their assessment scores through the module (Baggott & Rayne, 2001, p. 7).

Where instructors are using web-based assessment as a means of reducing their marking workload, the results are somewhat less positive. Many novices to the process have discovered that writing good multiple-choice questions is challenging and time-consuming. The use of multimedia—graphics, photos, audio clips, and simulations—broadens considerably the type of question that can be set but usually means the process of assessment design becomes a team production requiring IT support and even developmental testing.

Online Assessment

The whole category of online assessment strategies can be divided in two subcategories: (1) those that produce individual pieces of assessed work and (2) those that involve collaborative activities and/or a collaboratively produced components of assessed work.

A common form of individual online assessment is the student-produced website. The benefits of this approach derive from the public nature of the assessed work—whether assignments are only available just to the other students in the course or on an open website. The practice of students writing only for the eyes of their instructor or marker is surely one of the most ill-conceived aspects of current assessment processes. The Web has legitimated the concept of everyman as publisher. There are a number of ways in which this can be applied to assessment:

- Assignments from previous years can be made available in a digital repository, which becomes part of the course resources to be drawn upon by subsequent students.
- Current assignments can be accessible to students after the submission deadline—with or without grades and with or without feedback from the instructor.
- Assigning students the task of commenting on previous students' work is an excellent activity, which gives practice in applying the ideas and values of the discipline to specific instantiations of them.
- Student-produced websites can be assigned in subjects in which Web skills could not be expected or required by the provision of a template that obviates the need for html experience.

- Networks can be used to deliver model answers and help students see alternative approaches to written work.
- Online interaction with the tutor can be used as a way for students to discuss their assessment criteria as they work on their assignment.

An example of an individual process that capitalizes on communication is the following: students submit a written assignment, which is marked by the instructor and put into a file area. For the next assignment, students are asked to revise their first assignment on the basis of feedback from the tutor and from other students and in addition, to provide comments on at least two of the assignments of their peers. The benefits of this approach are that it provides an opportunity for learners to build on the feedback received and iteratively refine a piece of their own work. Second, it provides practice in assessing work in the discipline area and in offering constructive feedback (for other examples, see Bos, Kikstra, & Morgan, 1996; Davis & Berrow, 1998).

Collaborative forms of assessment have a much longer pedigree than online learning. However, the facilities of the Web have certainly provided added impetus for various collaborative practices and the whole online environment has endorsed a more community-centered approach to learning (Collis, 1998; Fiedeldey, 1999; McConnell, 1999). There are two aspects of collaborative assessment:

1. Assignments that require students to work together on the content and, usually, to submit a jointly developed piece of work.
2. Collaborative processes of grading student work.
3. Examples of jointly produced assignments can involve any of the following:
   - Part of the assignment being produced collaboratively and part individually (e.g., the introduction and conclusion being supplied by the individual student) hence giving incentive for both individual and team work.
   - A group submission in which each individual has taken a specific part identified for the marker.
   - A collaboratively produced piece of work in which the individual inputs cannot be distinguished.

There is a growing literature on the benefits, pitfalls, and critical theory underpinning these different approaches to collaborative assessment.

> In adult and professional education, there has been significant interest in developing more participative approaches to assessment, whether peer (carried out by fellow students), collaborative (jointly evaluated by learners and the tutor) or consultative (collectively between self, peer, and tutor but with ultimate responsibility resting with the tutor). These developments are par-

> ticularly appropriate in the case of participative courses, which are designed more generally to provide students with opportunities for influencing—for example—the content of the curriculum, the educational methods used, or the choice of topics for assignments (Trehan & Reynolds, 2001, p. 279–280).

Feedback from students usually indicates considerable disquiet about collaborative marks because of the problem of unequal contributions. A range of solutions have been sought to address this problem (see for example, Boud, 1981, 1989; Collis 1999; Cunningham, 1991; Freeman & McKenzie, 2000; Heron 1981; Mason 2000; Somervell, 1993).

The strongest message from the early adopters of online assessment is that students—especially undergraduates—need support and encouragement in tackling new concepts of assessment. Students generally find courses with an online activity-based pedagogy more demanding than traditional courses as they usually expect a more student-centered and independent approach to learning. If activities are to be a central part of the course philosophy, then their completion must be integrated with the assessment.

CHEATING IN THE ONLINE ENVIRONMENT

While plagiarism is hardly a new problem in higher education, it has taken on new dimensions with the billions of pages of information "freely" available to students on the Internet. There is considerable evidence that plagiarism is a growing problem (e.g., Hickman, 1998; Walker, 1998). It takes a number of forms:

- Phrases and passages used verbatim without quotation marks or reference to the author.
- Paraphrasing an author's work without a reference.
- Taking material found on the Web—text, images, graphics—and inserting it into an assignment without acknowledgement or permission.
- Submitting an assignment written by someone else as one's own work.

It goes without saying that all of these forms of plagiarism are much easier to carry out with the Web, and it is common knowledge that sites exist through which students can buy assignments—either "off the shelf" or "tailor made." A number of studies have investigated the practice from the student perspective (Gajadhar, 1998; Norton, Tilley, Newstead, & Franklyn-Stokes, 2001). The first problem they identify is student ignorance:

- of how and when to paraphrase,

- of how to reference correctly,
- of the basic rules of copyright, and particularly, that Web material is not copyright free, and
- of what constitutes plagiarism.

A detailed analysis of both deliberate and unintentional reasons for plagiarizing produced by the University of Alberta is available at http://www.library.ualberta.ca/guides/plagiarism/students.html. The article notes that:

> The idea that an author has "ownership" of language may be a ludicrous concept to students from different cultures. In some cultures, copying someone else's words or ideas is a high form of flattery. The notion that words can be "owned" is a facet of Western culture.

The second problem lies in the nature of assignments set by the instructor. Tasks that require regurgitation rather than application and interpretation and poor instructions or guidelines as to what is required are both highlighted as leading students to take an instrumental approach to assessment. Where assignments are perceived as a hurdle to get over, rather than an integral part of the learning experience of the course, students will respond accordingly, using whatever means are at their disposal. The Web provides an almost tailor-made solution.

This raises the most telling aspect of plagiarism as we struggle with information overload: surely we should be actively encouraging students to demonstrate an ability to use and re-use the material on the Web, rather than forcing them "to go underground." If we rethink assessment, surely we can devise assignments that value the skill of synthesizing existing material; of applying it to individual contexts; of selecting, transforming, and critiquing it. As the curriculum evolves with the impact of the Web, these "process" skills are more important for the digital age than content knowledge.

In fact, rethinking the nature of assignments is the approach favored by most academic researchers on plagiarism. Best practice advice includes assignments that require students to:

- Use their own experiences.
- Apply ideas to their own or at least to real-world contexts.
- Work collaboratively with their peers.
- Negotiate the assessment process with the instructor.

Nevertheless, many institutions are also pursuing technology-based approaches to the growth of plagiarism. Software has been devised to check for verbatim use of Web materials, but this is costly and slows down the marking procedures and in time would lead clever cheaters to change

the appropriate number of words to defeat the program. In fact, the threat of random use of such software might be as effective as the actual use of it.

A more problematic form of cheating in online courses centers on the identity of the student receiving the final accreditation. Distance education institutions have operated a system of remote examination sites with various procedures for ensuring that the student who sits the exam is the student who originally registered and eventually graduates. With the advent of online courses, offering access to higher education to a whole range of potential students needing flexible learning, there is a great demand for completely location-free study options. Furthermore, online courses attract a global student body, which makes place-based examinations difficult and expensive to operate. The question is, '"how can totally online procedures ensure that students are not cheating?" Of course, a wide variety of cheating is practiced on campuses that have the benefit of student identity cards, invigilated exams, and security procedures to handle question papers. So we cannot demand 100% certainty, but we must look for reasonable assurance. Even so, the greatest activity in this direction seems to be talk and speculation; no-one claims to have solutions, despite there being great interest and demand for procedures that allow individual students to take examinations from home (or indeed any other location) without any certified person on site.

Regarding web-based examinations, the question is "who or how many are answering the multiple-choice questions?" Some technological approaches look to webcams, which someone from a central site can use to "identify" the student at the other end. Iris identification is another hoped-for solution. Neither are foolproof because someone could be seated nearby and passing answers to the identified student.

Regarding timed essay-type final examinations, the problem of international time zones is also problematic. One solution is to have two different papers and two different exam times, so that no student will have to write the exam at night. With untimed, project-type final examinations, the problem is being reasonably sure that it is the registered student who does the background work and writes the essay. Some approaches to this include:

- Requiring a person of local standing to sign a document stating it is the student's own work.
- Setting a task so rooted in the course work or the student's context and experience that no one else could write it.
- Insisting that the student submit photocopies of all documented or referenced material along with their own work.

In fact, it could be argued that in courses in which there is extensive online interaction among students and with the tutor, there is much more

active involvement with the student, and hence, it is more readily apparent if a student's final assessed work is radically different from their written interactions during the course.

IMPLICATIONS OF INNOVATIVE ASSESSMENT STRATEGIES

While the problems of cheating and the need for improved learning outcomes from assessment indicate that a rethinking of assessment strategies is required, it is important to look at the impact this will have on students and online tutors. Feedback from the early adopters of innovative assessment strategies reveals some of the implications. The first point to note is that innovative program design has vastly outstripped innovative assessment design in online courses. A number of studies document the mismatch students have experienced between the philosophy of student-centered learning espoused by the course—participative, less hierarchical approach to teaching and learning, tutor as guide etc.—and the teacher-centered approach to assessment in which the assessor is still all-powerful, objective, and controlling (see Trehan & Reynolds, 2001). In one resource-based learning course, students were encouraged to develop the skill of browsing and selecting material to study in depth but were then confronted by a traditional examination for which they were unsure that they had covered the right materials (Macdonald, Mason, & Heap, 1999). Best practice always underlines the need for the assessment strategy to reflect the underlying pedagogy of the course. However, there are tensions becoming increasingly apparent between traditional curricular imperatives, grading policies and institutionally devised evaluative criteria, and the online environment, which inhibits such teacher-centered approaches and has defined a new role for the online tutor. McConnell (1997) highlights the contradiction between the intensively supportive and encouraging role of the online tutor and the need to grade assignments and uphold the institution's quality standards. Lauzon (1999) argues that many online tutors are somewhat unnerved by the multiple forms of authority which the Web and online interactions produce. While some educators have avoided online courses because of a perceived undermining of their authority, others have welcomed this leveling effect as a sign of students' new empowerment. Nevertheless, the multiple subjectivities of the online environment, the expectation of being available at all times to students, the relatively louder voice given to student criticism of all aspects of the course, plus the ambiguity of being both guide and assessor have led to the role of online tutor being challenging and relatively uncharted.

The implications for the assessment of courses with an online component can be summarized as follows:

- Web-assisted assessment has a powerful role to play in a formative and self-testing mode and a contributory role as a diagnostic and summative tool.
- The increased interactivity afforded by the Web provides the most exciting area for innovative assessment, especially for distance education. The access to a wider range of resources as well as to fellow students lead to a new set of skills and understandings that online courses are providing. These should be included in the course aims and objectives and also in the assessment of the course.
- Networking presents new challenges for designers of assessment, in establishing student identity and in ensuring that students are aware of guidelines on plagiarism.
- Electronic submission and marking of scripts lends itself to the use of a variety of formats in assignments, notably html. This opens up new opportunities for innovative assignments, which encourage research beyond conventional course materials and cater to a variety of interests and levels of experience.
- Students and tutors of online courses need considerable support in adapting to the new demands of the online environment. As assessment is the most critical point of the process, this is where support is most needed. Clarity in the requirements of assessment, openness regarding the marking procedures, and flexibility in the demands of the assignments are some of the ways in which this support can be demonstrated.

CONCLUSIONS

This chapter has argued the case for the need to rethink assessment practices in light of both the benefits and the problems of learning online. The primary reasons discussed were the following:

- The importance of process skills in knowledge management.
- The culture of lifelong learning.
- The need to integrate assessment with the learning activities of the course.
- The focus on collaborative and team-working skills.
- The overload of information on the Web.
- The growth of plagiarism.
- The need to assure student identity for online assessment.

Nevertheless, it is not the technology per se that improves student learning—the online environment is merely a space with a particular set of affordances. Most of what we know about teaching and learning—and about assessment—is applicable in any medium of delivery (Alexander & Boud, 2001, p. 4). Therefore, rethinking assessment for the online environment has two interlinked aspects:

1. A consideration of how best to transform what is already accepted as best practice in traditional environments for online courses.
2. An understanding of the impact of the online environment on teaching and learning generally and what this implies for online assessment strategies.

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CHAPTER 4

LEARNING TO SOLVE PROBLEMS ONLINE

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ABSTRACT

The limitations implicit in online development platforms constrain the nature of the instruction that can be developed and delivered using those platforms. Popular platforms do not support alternative forms of knowledge representation by learners, authentic forms of assessment, or the use of distributed tools to scaffold different forms of reasoning. Because these platforms replicate face-to-face instruction, they rarely support any form of problem solving, which is the most authentic form of learning in everyday and professional contexts. In this chapter, I describe different kinds of problem solving that can and should be supported in online learning in order to prepare learners for life. Next, I describe two different approaches to designing online problem-based learning environments. The first approach is to tailor environments to meet the needs and parameters of specific kinds of problems. In order to achieve economies of scale necessary to address a range of problems, I describe the development and initial testing of architectures for developing learning environments for solving story problems and troubleshooting problems. Developing and testing these architectures will

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prove challenging; however, the greatest difficulty may be convincing higher education and business educators of the need for learning to solve problems.

PROBLEM: REPRODUCTIVE LEARNING IN ONLINE COURSE DELIVERY

Marra and Jonassen (2001) showed that popular online course delivery and management systems, such as WebCT, Blackboard, or e-College, do not support meaningful forms of learning through the use of alternative forms of knowledge representation by learners, authentic forms of assessment, and the use of distributed tools to scaffold different forms of reasoning. Firdyiwek (1999) reviewed three popular online courseware systems (Web Course in a Box, WebCT, TopClass) for their pedagogical affordances. He found that they all demonstrate an ability to support the knowledge acquisition by providing access to information and assessing retention using multiple-choice, true/false, and matching tests. He also concluded that all three have extensive capabilities for supporting "competency-based teaching of discrete information and processes" (p. 33) and that the pedagogical affordances of the systems represent a behaviorist/empiricist model of pedagogy. These systems, however, could not support more flexible, open-ended, or qualitative pedagogies.

Because these systems are designed to support only knowledge acquisition, the range of student learning outcomes is restricted to reproductive learning. Designers or students can work around these limitations by seeking out or providing interactions, tools, or other resources outside of the environment. Use of these supports, however, relies on student self-regulation that is too often under-developed, resulting in student frustrations and negative student perceptions of the learning experience. These "work-arounds" also require instructional design and software production skills on the part of the faculty member in order to overcome the limitations of the system. That expertise seldom exists in faculty members for whom these systems were developed. Therefore, faculty members tend to produce reproductive instruction that the systems support. Why do these packages restrict learning outcomes?

The architectures of the popular online course delivery and management systems were designed to resemble traditional face-to-face instruction. That is, the pedagogies employed in online learning systems are similar to those typically employed in traditional classroom settings. Teachers or professors organize readings related to the topics being studied, lecture to the students about the topic, answer questions if any are raised in online conferences or chat rooms, and then assess whether students remember the information that was provided by the system, most often using multiple-choice examinations. Online course packages pro-

vide functionalities to deliver lectures, readings, synchronous and asynchronous conferences, and quizzes. These instructional methods make traditional epistemological assumptions about learning and the transmission of knowledge.

More importantly, these instructional methods ensure a lack of innovation in online learning. Despite the perceptions of educators and administrators that online learning is innovative, the design of the systems for delivering and managing it preclude meaningful innovation; however, I believe that online learning provides the opportunity, if not the obligation, to innovate. A prerequisite for innovation is instructional affordances in the systems for engaging and supporting the completion of more meaningful, authentic kinds of learning tasks. That is, online learning environments can and should be designed to engage and support more meaningful learning—to truly innovate.

Why is innovation in online learning important? Online learning is being used most frequently in higher education, continuing education, and corporate training. Those educational contexts are primarily responsible for preparing students to assume or enhance careers in everyday and professional contexts. In those contexts, people are not rewarded for their abilities to acquire (memorize) knowledge. Rather, they are rewarded for their ability to perform complex tasks and solve problems. In universities, continuing education and corporate training contexts, however, learning is almost always conceived of as knowledge acquisition. In order to facilitate that acquisition, information is organized, simplified, and abstracted to make it more easily and efficiently transmitted, thereby preventing meaningful learning. So, the major problem with a knowledge acquisition conception of learning is that it does not prepare learners for functioning in everyday and professional contexts.

There are other related problems with the knowledge acquisition conception of learning. First, acquiring knowledge does not lead to or facilitate complex skill or problem solving development. Second and more insidiously, knowledge acquisition assumes an absolutist epistemology in which content is believed to represent the truth (Jonassen, Marra, & Palmer, in press). Unfortunately, that epistemology and the methods that assume it retard intellectual development in learners. That is, when faced with ill-structured problems in everyday and professional contexts, students are bereft of the intellectual skills and the epistemic dispositions to solve them. They never learned to solve problems, and they were taught that the truth is what was delivered to them by the online package because the online medium of instruction could not support complex thinking and problem solving.

The sad irony is that our models and methods of face-to-face learning, which online learning models too frequently emulate, are contradicted by

reality. Learning in everyday and professional contexts, in which people live and work is omnipresent and essential to survival, let alone progress. In order to advance their culture (be it community or corporate), individuals and communities must learn; however, their learning cannot be described by any subject matter ontology. They learn as individuals and communities to make sense of phenomena in order to solve problems. Their learning is activity-based, not content-based. Learning is situated in the problems they are solving, so the learning issues are emergent from those problems. Those issues cannot be reliably predicted by any curriculum. Learning and solving problems in everyday and professional contexts relies on knowledge distributed throughout a community of practice. The medium of learning is often social negotiation of meaning, not individual retention of content. Perhaps, the most important difference is that in everyday and professional contexts, individuals and communities learn *how* to do things, not *about* things.

Online learning has the potential to reform the ways that students learn. If online learning represents a true innovation rather than a mere change of delivery vehicles (Clark, 1994), then it must exploit its potential for representing complex problems, providing knowledge representation tools, and engaging learning and practice communities in social negotiation, all of which require alternative modes of assessment. I believe that online learning designers are professionally obligated to evaluate the state of affairs and decide which world should be modeled in their instruction. Should we be presenting well-organized and over-simplified corpora of information for students to remember, or should we support learning how to solve authentic, complex, and ill-structured problem?

My position is clear. Telling students about the world and quizzing their recall of what we told them is an insult to our learners. Should not we expect more of them? In addition, that pedagogy precludes them from developing the knowledge-seeking skills necessary for learning how to do something useful. I believe that the only legitimate goal of professional education, either in universities, continuing education, or corporate training, is problem solving. Why? Because people in everyday and professional contexts must learn to solve problems, and while learning to solve problems, learners are more conceptually engaged, resulting in more meaningful learning. Online learning environments should focus on how to solve problems. Before describing how to do that, I need to briefly articulate what problem solving is.

WHAT IS PROBLEM SOLVING?

Problem solving has four critical attributes. First, a problem is an unknown value, process, method, etc. Second, that unknown is worth finding. In order to find the unknown, problem solving requires the mental representation of some situation in the world. That is, human problem solvers construct a mental representation of the problem, known as the problem space (Newell & Simon, 1972). Third, they may do that individually, or they may socially co-construct some representation of the problem. Fourth, problem solving requires some mental manipulation of the problem space, such as model building, hypothesis generation, speculation, solution testing, information gathering, etc.

Despite traditional assumptions about the generalizability of problem-solving skills, contemporary research and theory asserts that the nature of problems is determined by their context as well as the cognitive requirements for solving the problem. Different kinds of problems engage different problem-solving processes. Problems and problem solving vary in several ways, the most important of which is their level of structure (space limitations preclude an elaboration of the other dimensions; see Jonassen, 2000). Jonassen (1997) distinguished well-structured from ill-structured problems and recommended different design models for each. The most commonly encountered problems, especially in schools and universities, are well-structured problems. Well-structured problems typically present all elements of the problem; engage a limited number of rules and principles that are organized in a predictive and prescriptive arrangement; possess correct, convergent answers; and have a preferred, prescribed solution process. These are the kinds of problems that are most often presented in formal education, particularly in mathematics and the sciences. Ill-structured problems, on the other hand, are the kinds of problems that are encountered in everyday practice. Ill-structured problems have many alternative solutions to problems, vaguely defined or unclear goals and constraints, multiple solution paths, and multiple criteria for evaluating solutions; they are more difficult to solve.

Jonassen (2000) described a typology of problems along a continuum from well-structured to ill-structured, including puzzles, algorithms, story problems, rule-using problems, decision making, troubleshooting, diagnosis-solution problems, strategic performance, systems analysis, design problems, and dilemmas. This typology assumes that there are similarities in the cognitive processing engaged within these classes of problems. Within each category, problems can vary with regard to abstractness, complexity, and dynamicity. Because of space limitations, only some of these problems will be described.

Story Problems

Story problems are the most commonly encountered problems in formal education. From elementary mathematics through graduate level courses in dynamics, textbook chapters present story problems. Story problems include elementary combination, cause/change, or comparison problems in math (Joe has three marbles; Jane gave him three more; how many does he have?); calculating resistance given voltage and amperage; calculating reagents needed to form a specific precipitate in a chemical reaction; or calculating interest accrued on a savings account. They usually take the form of embedding the values needed to solve an algorithm into a brief narrative or scenario. In order to meaningfully solve story problems, learners must construct and access a problem schema and apply that schema to the current problem. If they access the correct schema, the solution procedure is usually embedded within that schema. However, numerous difficulties occur when students extract the values from the narrative, insert them into the correct formula, and solve for the unknown quantity because they focus too closely on surface features of the problems (Woods et al., 1997). Why do students use this ineffectual strategy? Because too often that is how they were taught to solve problems. Teachers and textbooks demonstrate procedures for identifying variables, inserting the variables into formulae, and solving for the unknown.

In cases where story problems are solved in online courses, a similar tutorial strategy is typically used. Simple feedback is provided, but students receive no conceptual instruction. Solving story problems requires understanding the structure of the problems. The instruction must emphasize the structural components of the problem and its context and distinguish the structure of any problem from all others in the domain (Jonassen, in press). Later in this chapter, I will demonstrate an architecture for conceptually supporting story problem solving online.

Rule-Using Problems

Many problems have correct solutions but multiple solution methods and multiple rules governing the process. They tend to a have clear purpose or goal that is constrained but not restricted to a specific procedure or method. Rule-using problems can be as simple as expanding a recipe to accommodate more guests and as complex as completing tax return schedules or evaluating a loan application. Using an online search system to locate relevant information on the Internet is a good example of rule-using problems. The purpose is clear: find the most relevant information in the least amount of time. That requires selection of search terms, constructing

effective search arguments, implementing the search strategy, and evaluating the utility and credibility of information found. Although research on online searching abounds, there is none that conceives of it as a kind of problem solving. Learning how to apply multiple rules to problems in a conceptual way needs to be studied, both face-to-face and online.

Troubleshooting Problems

Troubleshooting is one of the most commonly accepted forms of everyday problem solving. Maintaining an automobile, aircraft, or any complex system requires troubleshooting skills. Debugging computer programs requires troubleshooting. The primary purpose of troubleshooting is fault state diagnosis. That is, some part of a system is not functioning properly, resulting in a set of symptoms that has to be diagnosed and matched with the user's knowledge of various fault states. Troubleshooters use symptoms to generate and test hypotheses about different fault states. Unfortunately, troubleshooting is too often taught in face-to-face instruction as a set of diagnostic procedures. Procedural understanding of the process represents only one kind of knowledge. In addition to procedural knowledge of the process, troubleshooting also requires conceptual knowledge of the system, strategic knowledge of when to use tests and methods, and hypothesis generation and testing. Later in this chapter, I will briefly demonstrate an architecture for representing and supporting meaningful troubleshooting online.

Strategic Performance

Strategic performance entails complex activity structures in a real-time environment, where the performers apply a number of tactical activities to meet a more complex and ill-structured strategy while maintaining situational awareness. In order to achieve the strategic objective, such as teaching in a classroom or quarterbacking a professional football offense, the performer applies a set of complex tactical activities that are designed to meet strategic objectives. Pursuing strategies through tactical activities requires applying a finite number of tactical activities that have been designed to accomplish the strategy. However, an expert tactical performer is able to improvise or construct new tactics on the spot to meet the strategy (e.g. devising a new strategy in a courtroom when unexpected evidence has been heard). Those adjustments are contextually constrained. In face-to-face education, students are usually taught the prerequisite skills but not how to engage and regulate them in real time. That skill requires real-time

simulations that are difficult to provide in both face-to-face and online instruction.

Design Problems

Among the most ill-structured but meaningful problems are design problems. Whether designing instruction, an electronic circuit, a bicycle that flies, a marketing campaign for a new Internet company, or any other product or system, designing requires applying a great deal of domain knowledge with a lot of strategic knowledge resulting in an original design. What makes design problems so ill-structured is that there are seldom clear criteria for evaluating success. The client either likes or hates the result but cannot articulate why; therefore, skills in argumentation and justification help designers to rationalize their designs. Although designers always hope for the best solution, the best solution is seldom ever known. Also, most design problems are complex, requiring the designer to balance needs and constraints of the design and the clients. Despite the difficulties, design problems are among the most common in professional practice. Virtually every engineer, for example, is paid to design products, systems, or processes.

Design problem solving is too seldom taught in face-to-face or online classes, in part because it is so ill-structured and complex. That situation is changing slowly, as capstone design courses are being added to curricula and innovations (Kolodner, in press).

Dilemmas

Dilemmas are the most ill-structured kind of problem because there typically is no solution that will ever be acceptable to a significant portion of the people affected by the problem. The continuing problems in Palestine or the Balkans are dilemmas. Usually, there are many valuable perspectives on the situation (military, political, social, ethical, etc.), but not one is able to offer a generally acceptable solution to the crisis. The situation is so complex and unpredictable that no best solution can ever be known. Dilemmas are often complex, social situations with conflicting perspectives, and they are usually the most vexing of problems. They are almost never taught in face-to-face classes. However, online learning environments are uniquely geared to support this kind of problem solving.

SOLUTION: REQUIRE LEARNERS TO SOLVE PROBLEMS ONLINE

If you accept my premise that online learning (at least for professional education) should engage and support learners in solving problems of some kind, then online learning environments and systems must be re-engineered to provide the functionalities required to support learning to solve different kinds of problems. We should not avoid this task merely because it is avoided in face-to-face classrooms. In order to engage learners in solving problems, online learning environments must provide learners the intellectual and social support systems that are required to solve the problems. First and foremost, this means that problems come first, and that content instruction, in whatever form it assumes, is provided in support of the problem-solving activity. How can this be accomplished?

When designing problem-solving environments for online learning, we first need to analyze the kinds of problem solving that our learners need and then design and provide problem-based learning environments to help them learn how to solve those problems. In order to do that, we must develop cognitive models of the kind of problem solving that students need to learn by using a variety of appropriate needs assessment and task analysis tools. Having analyzed problem types, we then must develop instructional design models for each kind of problem solving and map those models onto problem-based architectures for online learning. I have developed various learning and instructional models for story problems and troubleshooting. These models will be demonstrated later in this chapter. Finally, faculties and teachers must be reoriented and motivated to engage their students in these problem-based architectures. None of this can work until and unless teachers and professors believe that students should learn to solve problems, not memorize information. This part of the process will likely be the most difficult.

There are at least two general approaches to designing these problem-based learning environments (PBLEs). The first is to apply a variety of models and methods of learning to support the creation of environments that are tailored to individual problems. This method may not be efficient enough to address the range of problems that students may need to learn to solve. To the degree that problems are similar, we can design and develop architectures for creating type-specific PBLEs. Both methods will be briefly described along with a statement of progress to date.

Solution 1: Design Problem-Specific Environments

There are a number of conceptions of learning environments that engage learners in problem solving, though that is not their explicit intention. Rich Environments for Active Learning (REALs) are instructional systems that engage learners in realistic, authentic, complex, and information-rich learning contexts; support intentional, self-regulated learning; support cooperative efforts in learning; and engage learners in complex problem solving (Grabinger, 1996). Open-ended learning environments (OELEs) stress the use of manipulable objects to support experiential learning and student model building (Hannafin, Hall, Land, & Hill, 1994). In goal-based scenarios (GBSs), students become active participants in complex systems. They employ a "learning by doing" architecture (Schank, Fano, Bell, & Jona, 1993/1994) in which learners are immersed in a focused, goal-oriented situation and required to perform authentic, real-world activities. These environments, like most innovations based on situated learning theory, emphasize the importance of authentic tasks. Authentic tasks more often than not entail problem solving.

Our work has focused on constructivist learning environments (CLEs), which like REALs, OELEs, and GBSs, represent another generic model for designing authentic complex learning environments. CLEs consist of a number of integrated and interdependent components: the problem space (including context, representation, and manipulation spaces), related cases, information resources, cognitive tools, and collaborative tools (Jonassen, 1999; see Figure 4.1). An example of CLE is a learning environment designed to support students in an undergraduate management course in solving aggregate planning problems (Jonassen, Prevish, Christy, & Stavurlaki, 1999). Aggregate planning is a decision-making process where managers attempt to balance sale, demand, inventory, and workforce with technology.

The focus of any CLE is the problem that learners attempt to solve. It constitutes the learning goal. The kinds of problems that are most often solved in CLEs are ill-structured problems, such as those described before. In the aggregate planning environment, we presented two companies that are dealing with aggregate planning problems: (1) an accounting firm, Brilliant Deductions Tax Accounting, which is a relatively easy case, and (2) a soft drink company, Bloat Pop, Inc., which is a much more complicated problem. Learners are coached to attempt the accounting case first.

The problem/project space in CLEs consists of three integrated and highly interrelated components: the problem presentation or simulation, the problem manipulation space, and the problem context. The physical, sociocultural, and organizational context that surrounds any problem helps to constrain and define the project. CLEs must describe important details

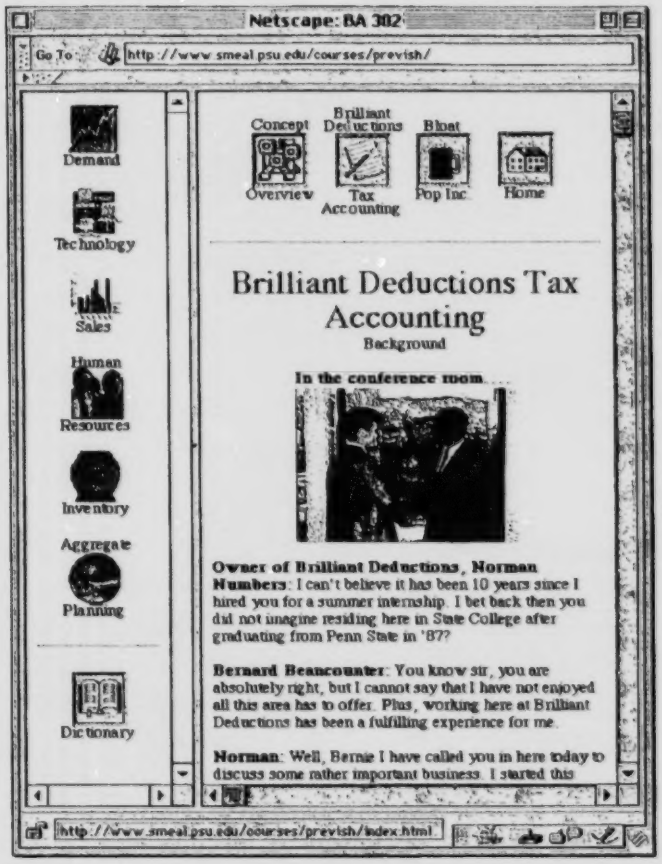
Netscape: BA 302
Go To:
http://www.smeal.psu.edu/courses/previsb/
Demand
Technology
Sales
Human Resources
Inventory
Aggregate Planning
Dictionary
Concept Overview
Brilliant Deductions Tax Accounting
Bloat Pop Inc.
Home
Brilliant Deductions Tax Accounting
Background
In the conference room...
Owner of Brilliant Deductions, Norman Numbers: I can't believe it has been 10 years since I hired you for a summer internship. I bet back then you did not imagine residing here in State College after graduating from Penn State in '87?
Bernard Beancounter: You know sir, you are absolutely right, but I cannot say that I have not enjoyed all this area has to offer. Plus, working here at Brilliant Deductions has been a fulfilling experience for me.
Norman: Well, Bernie I have called you in here today to discuss some rather important business. I started this
http://www.smeal.psu.edu/courses/previsb/index.html

Figure 4.1. Brilliant Deductions background page.

of the context in which the problem will be solved. This may include description of the actors and stakeholders, and their backgrounds, beliefs, and goals; the organizational climate; and the history and cultural constraints implicit in the environment. The problem context and problem representation become a story about a set of events that leads up to the problem that needs to be resolved. The way in which the problem or project is introduced to the learner is critical to the amount of buy-in on the part of the learners. The problem presentation has to be interesting, appealing, and engaging. The purpose of the problem presentation is to simulate the problem in the context in which it is normally and naturally encountered. Why? Because understanding the context is essential to understanding the problem. The context defines and structures the problem.

The problem or project space must also provide students with the opportunity to manipulate or massage the problem in order to make it more meaningful. Students cannot assume any ownership of the problem unless they know that they can effect the problem situation in some mean-

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ingful way, so manipulating the phenomena and seeing the results of those manipulations are important. In each aggregate planning problem, learners begin by entering into a conversation with two employees of the firm (see Figure 4.1). The narrative format for representing the problem is more motivating because it immerses the student in a real world situation. Each of the icons on the side, "Demand," "Technology," "Sales," "Human Resources," and "Inventory," represent the different aspects of the case. Clicking on the "Sales" icon presents historical sales information for Brilliant Deductions; clicking on the Inventory button provides information about available inventory; and so on.

When the CLE expects students to solve novel, ill-structured problems, it is necessary to provide sets of related experiences that students can draw up on to help them understand. Related cases in learning environments support learning in two important ways: by scaffolding memory through case-based reasoning and by representing complexity (multiple perspectives related to any problem). Related cases support memory by providing representations of the experiences that learners have not had in order to illustrate what they could have learned in these situations. Related cases also help to represent complexity in learning environments by providing multiple perspectives or approaches to the problems or issues being examined by the learners. For each of the kinds of information needed to solve the problem (Demand, Technology, Sales, Human Resources, and Inventory), links to related cases present historical accounts and information for companies similar to those in the problem-solving scenario. These related cases tell stories about how those similar companies accommodated demand, technology needs, sales, human resources, and inventory problems in their companies. By presenting related cases in learning environments, you are providing the learners with a set of experiences to compare to the current problem or issue.

In order to investigate phenomena, you need information about them. Information is presented in order to support practice. In order to be accessible and useful, information banks, regardless of their form, need to be organized in meaningful ways, preferably in ways that support the kind of thinking that you want your learners to do. The Aggregate Planning CLE provides a variety of information resources about the aggregate planning process that help the students to understand the content well enough to solve the problem. Students are provided text documents, graphics, and sound resources about topics.

CLEs should represent the complexity of the real-world task it simulates. However, that complexity often calls on skills that learners do not possess. Thus, it is necessary to scaffold their performance of those activities, a in order to do that, it is necessary to identify the skills that are required to solve the problem or complete the mission that is embedded in the prob-

lem representation. Having identified those skills, it is necessary to determine whether those are skills likely to be possessed by the learners. If they are not, then it is necessary to build in cognitive tools that scaffold the learners' abilities to perform those tasks. Cognitive tools may be organization tools for analyzing ideas, dynamic modeling tools for creating representations of their mental models, visualization tools for helping to "see" phenomena in different ways, or conversation tools for enabling them to build collaborative knowledge bases. CLEs embed a suite of tools to help learners think in appropriate ways. After having investigated all aspects of the case (demand, technology, sales, human resources, and inventory) and the related cases (described next), students are ready to engage in the aggregate planning process. Examining each of these elements provides the necessary background for engaging in aggregate planning. Clicking on the "Aggregate Planning" icon links to the instructions for downloading and using an Excel spreadsheet to calculate costs. The spreadsheet enables students to manipulate all of the variables in the case and test the results of those manipulations. The formulae enable students to speculate by entering different values for each of the variables in the planning process. When the students complete their analysis and are satisfied with their projections, they submit their spreadsheets to an electronic grading service. Because several hundred students are typically enrolled in this operations management course, electronic scoring is essential. In the past, this has meant multiple-choice questions. This CLE provides an authentic alternative to multiple-choice exams that requires learners to speculate, make inferences, and solve problems.

CLEs provide access to shared information and knowledge building tools to help learners to collaboratively construct socially shared knowledge. Problems are solved more readily and meaningfully in groups. In order to support collaboration, CLEs must also provide for computer conferencing, chats, MUDs or MOOs to facilitate dialog and knowledge building among the community of learners. Students are required to solve the problem in collaborative groups of three.

Our objective was that students learn how to solve aggregate planning problems, so the only reasonable assessment of that objective is to require students to solve aggregate planning problems. Assessment of aggregate planning was problematic because all course assessments must be machine gradable. While too many examinations in the college are multiple-choice, they are not appropriate for solving ill-structured problems. So, the spreadsheet that was used as a problem-solving tool also provides the medium of assessment. The spreadsheets allow for self-assessment and self-adjustment because students can see the progress they are making.

Using a generic architecture, such as CLEs, it is possible to build learning environments that engage and support students in learning to solve almost

any kind of problem. However, analyzing problems individually and designing problem-specific environments may prove to be too time-consuming. In order to provide instruction for a range of problems, it is necessary to achieve economies of scale by standardizing components of instruction. The latest approach that I am investigating is the development of type-specific problem-solving architectures. I will describe that approach next.

Solution 2: Design Online Problem-Solving Architectures

Because students often need to learn to solve numerous problems within a domain, tailoring individual problem-specific learning environments is likely to prove inefficient. In order to achieve economies of scale, it may be necessary to develop PBLE architectures to support learning to solve classes of problems or, at the very least, class-specific problems within a domain. These architectures can then be used as templates for creating PBLEs for a variety of problems of the same kind within a domain. Such architectures must accommodate the best theories and models for learning to solve each kind of problem. I will briefly describe architectures for building PBLEs for story problems and troubleshooting problems. Architectures for the other previously discussed problem types are being developed.

Story Problems

Jonassen (in press) has analyzed the most commonly encountered kind of problem, story problems. From simple combination, comparison, and cause/change problems in beginning mathematics (Riley, Greeno, & Heller, 1983) to complex story problems in engineering dynamics classes, story problems are the most commonly used and extensively researched. Found at the back of thousands of textbook chapters, these problems are normally solved by learners identifying key words in the story, selecting the appropriate algorithm and sequence for solving the problem, applying the algorithm, and hopefully checking their responses (Sherrill, 1983). However, this direct translation problem-solving strategy is insufficient for learning to transfer problem-solving skills. Solving story problems requires not only calculation accuracy, but also the semantic comprehension of relevant textual information, the capacity to visualize the data, the capacity to recognize the deep structure of the problem, the capacity to correctly sequence solution activities, and the capacity and willingness to evaluate the procedure that used to solve the problem (Lucangelli, Tressoldi, & Cendron, 1998). Difficulties in story problem solving are more related to lack of structural knowledge of the problems than the ability to calculate. Text comprehension and working memory also play important roles in story problem solving.

Contemporary research has emphasized the importance of problem schemas in solving story problems. Problem schemas are the mental models that learners construct about different kinds of story problems. Successful problem schemas are comprised of a semantic model of the situation described in the text, a model of the deep structure of the problem, and a model of the processing operations required to solve the problem (Riley & Greeno, 1988). Solving story problems has a significant conceptual component that drives the selection and application of the procedural process. Problem types vary by semantic structure (semantic relations) and identity of unknown quantity, both of which consistently affect problem difficulty; therefore, identifying these types is essential to transfer of problem solving. In order to solve story problems, learners must:

- Parse problem statement.
- Search for appropriate problem schema.
- Use schema to classify problem type:
  - Compare surface content to previously solved problems.
  - Compare semantic model to previously solved problems.
- Generate problem space:
  - Identify problem components from surface content.
  - Map onto problem structure in semantic model.
  - Access processing operations.
- Map values into formula.
- Estimate type, units, and size of solution.
- Solve the formula.
- Reconcile with estimate (was result similar to estimate? If not, generate new problem space).
- Associate problem content with semantic model and file according to problem type.

This relatively sequential model for solving story problems belies the conceptual nature of the process. Essentially, transferring the ability to solve any particular kind of story problem requires that learners construct a mental model of the problem type (a problem schema) that includes a situational model of the kinds of surface content as well as a semantic model of the structure of the problem. For example, simple mathematics motion problems typically use trains, cars, or airplanes traveling in one direction or another. In order to be able to solve motion problems, the learner's problem schema must include a structural model or semantic model of the relationships between the different entities. There are different kinds of motion problems, such as overtake (one vehicle starts and is followed later by second that travels over the same route at a faster rate), opposite direction (two vehicles leaving same point traveling in opposite directions), round trip (a vehicle travels from point A to B and returns), or

closure (two vehicles start at different points traveling towards one another) (Mayer, Larkin, & Kadane, 1984). Each kind of motion problem has a different set of structural relations between the entities that call on different processing operations. It is essential that learners construct problem schemas that indicate comprehension of the surface elements of the problem, the semantic relationships between the entities in the problem, and the mathematical relations implied by those semantic relations.

Given those cognitive requirements, instruction designed to support learning how to solve story problems should:

- Describe problem type and relate to graphic organizer highlighting problem type in taxonomy of problem types within domain.
- Present conceptual model of problem space, including:
  - Surface content.
  - Semantic model of problem.
  - Processing operations.
- Ask students to estimate solution type, units, and size.
- Model problem solution through worked example using voice and animated agent (if online):
  - Classify problem type.
  - Estimate outcome.
  - Parse surface content.
  - Map elements onto semantic model.
  - Convert semantic model into formula.
  - Solve for goal.
  - Reconcile with estimate (units and size).
  - Model metacognitive strategies and reflection on solution.
- Pose practice problems by selecting similar and then dissimilar surface content.
- Students to practice mapping surface content onto semantic model.
- Students build a formula (use spreadsheet to explicitly represent algorithmic process.
- Students to use a spreadsheet to solve practice problems.
- Provide feedback on problem solutions (relate to problem elements and problem type).
- Review problem type and relate to problem taxonomy.

An architecture for embedding physics story problems is illustrated in Figure 4.2. The verbal problem is presented in the upper right hand corner of the screen shot in Figure 4.2. This problem is a simple conservation of energy problem. In order to use the set identifier, the student clicks on "New Set." A set box consists of three smaller boxes. The top box identifies the object, and the lower boxes in each set box identify the quantity and the units describing the object. The student highlights objects and values

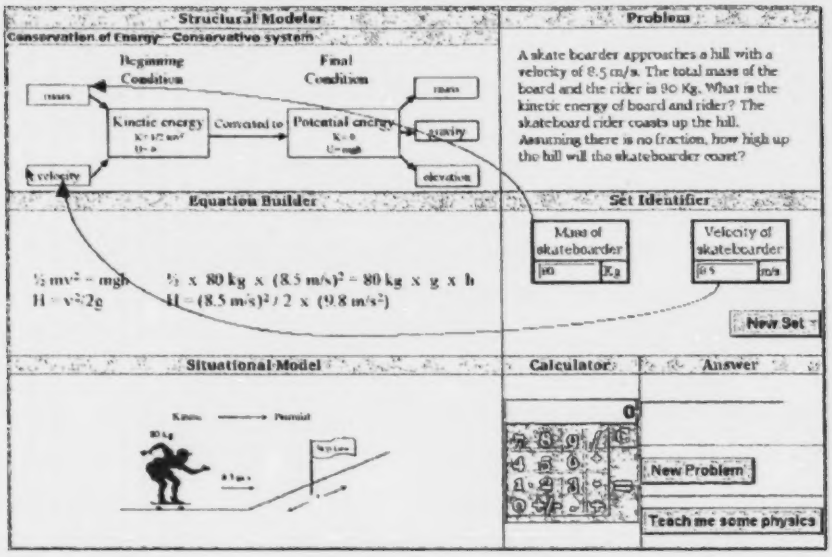
Structural Modeler
Conservation of Energy—Conservative system
Beginning Condition
Final Condition
mass
Kinetic energy
Converted to
Potential energy
gravity
velocity
elevation
Problem
A skate boarder approaches a hill with a velocity of 8.5 m/s. The total mass of the board and the rider is 90 Kg. What is the kinetic energy of board and rider? The skateboard rider coasts up the hill. Assuming there is no friction, how high up the hill will the skateboarder coast?
Equation Builder
½ mv² = mgh
H = v²/2g
½ x 80 kg x (8.5 m/s)² = 80 kg x g x h
H = (8.5 m/s)² / 2 x (9.8 m/s²)
Set Identifier
Mass of skateboarder
Velocity of skateboarder
New Set
Situational Model
Calculator
Answer
New Problem
Teach me some physics

Figure 4.2. Architecture for creating story PBLEs.

from the story problem and drags and drops them into sets. Two sets have been identified in Figure 4.2 (the mass of the skateboarder and the velocity of skateboarder). One of them is the primary object that is needed to solve this problem.

In the structural modeler (upper left in Figure 4.2), the student begins by pulling down a menu to select the type of problem being solved (in this case, a conservation of energy problem in a conservative, or frictionless system; selection not shown). Selecting that problem type results in a structural model of that problem type appearing in the structural modeler space (see Figure 4.2). The model describes the structural components of the problem. Students drag and drop the sets from the set identifier into the components of the structural modeler. In this problem, the student needs to identify the initial energy conditions (kinetic and potential) and the ending energy conditions (kinetic and potential). In the initial conditions, potential energy is 0, and kinetic energy is determined by calculating $1/2mv^2$. The student drags the mass and velocity sets into the structural modeler. In the ending condition, kinetic energy is 0 (skateboard stops), and potential energy is determined by calculating mgh.

In order to use the equation builder, the student drags the formulas from the structural model into the equation space, cancels out and reorganizes the variables, and uses the calculator to solve the formula.

The situational model is a visual depiction of the context. The situational model helps learners to relate the problem structure to a real world context. Being able to compare and contrast the situational and structural models will provide for a richer mental model of the problem type. The

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ANIMATE (Nathan, 1998) environment, for instance, provides an animated version of the problem, which adds explanatory power.

Instruction consists of worked examples using this environment to illustrate how to solve at least three problems for each problem type before allowing students to practice. In a face-to-face environment, the teacher would work through these examples. In a technology-supported environment, an animated lifelike pedagogical agent (Lester, Stone, & Stelling, 1999) can be used to work through the examples. The agent would first read the verbal problem representation in the learning environment, looking for clues to help in classifying the problem type (in our example, conservation of energy in a conservative system). The agent would then select that problem type. According to the resulting structural model, the agent must find the initial and final energy conditions. Returning to the problem, the agent would begin to identify the sets required for the problem, move those sets onto the structural model, and then map those values into a formula in the equation builder. The agent would perform a unit check and then estimate the size of the answer. The agent would then solve for the answer and reconcile the outcome with the estimate. Performing this demonstration with two other more complex problems would prepare the student for completing practice items. At any time in the worked example or practice phases, the student could elect to have the agent teach some physics, that is, present conceptual instruction on the nature of the problems, the entities involved, and their physical relationships to each other.

Instruction would consist of worked examples of other problems being solved in this environment. Practice items would be presented that would allow students to use the environment to solve problems along with feedback about their solutions. Funding is being sought to develop these architectures for physics and other areas.

Troubleshooting Problems

Troubleshooting is among the most commonly experienced kinds of problem solving in the professional world. From a faulty modem to multiplexed refrigeration systems in a modern supermarket, troubleshooting attempts to isolate fault states in some working system. Having found the fault, the part is replaced or repaired. Troubleshooting is often conceived of as a linear series of decisions that lead to fault isolation. That approach can work quite effectively in a performance support system for helping novices solve simple diagnosis problems; however, it is inadequate for training competent, professional troubleshooters. Effective troubleshooting requires system knowledge (conceptual knowledge of how the system works), procedural knowledge (how to perform problem-solving procedures and test activities), and strategic knowledge (strategies such as search-and-replace, serial elimination, and space splitting) (Pokorny, Hall,

Gallaway, & Dibble, 1996). These skills are integrated and organized by the troubleshooter's experiences. The troubleshooter's mental model consists of conceptual, functional, and declarative knowledge, including knowledge of system components and interactions, flow control, fault states (e.g. fault characteristics, symptoms, contextual information, and probabilities of occurrence), and fault testing procedures. The primary differences between expert and novice troubleshooters are the amount and organization of system knowledge (Johnson, 1988). Troubleshooting requires an integrated understanding of how the system being troubleshot works, which is best taught through functional flow diagrams (Johnson & Satchwell, 1993). In order to solve troubleshooting problems, learners must:

- Identify fault state and symptoms.
- Construct problem space of system:
  - Describe goal state (How do you know when system is functioning properly?).
  - Identify subsystem fault (e.g. space splitting).
- Examine faulty subsystem(s).
- Diagnosis process:
  - Use experience from previous cases.
  - Rule out least likely hypotheses.
  - Generate initial hypothesis and assumptions.
  - Test hypotheses based on domain knowledge.
  - Interpret results of test.
  - Confirm or reject validity of hypotheses (If rejected, generate new hypothesis).
- Implement solution.
- Test solution(s) (Is goal state achieved?).
- Record results in fault database.

Troubleshooting is best facilitated by experiential knowledge, that is, the knowledge that accrues from experience in troubleshooting systems. Technicians through physicians can recall with extraordinary accuracy problems that they have troubleshot many years before. The problems that are most completely and accurately recalled are those that are most difficult to solve because the problem solver was more conceptually engaged in the process. Teaching novices to troubleshoot requires that they troubleshoot as many problems as possible. In order to support learning how to troubleshoot, instruction should:

- Present system description with symptoms (see Figure 4.3).
- Enable learner to identify fault state and symptoms.
- Require learner to describe goal state (How he or she knows when system is functioning properly?).

- Provide access to fault database, including the following fields:
  - fault
  - subsystem
  - symptoms
  - failure mode
  - strategies
  - results
  - effects
- Require learner to examine faulty subsystem(s).
- Test hypotheses in troubleshooter:
  - Action to be taken (test, remove/replace, eliminate, etc.).
  - Cost of action (time, materials, labor, downtime, etc.).
  - Fault hypothesis.
  - Identify subsystem fault occurs on system model, and provide feedback.
  - Result of action.
  - Interpret results of action.
  - Confirm or reject validity of hypotheses (If rejected, take new action).
- Implement solution.
- Test solution(s) (Is goal state achieved?).
- Record results in fault database.

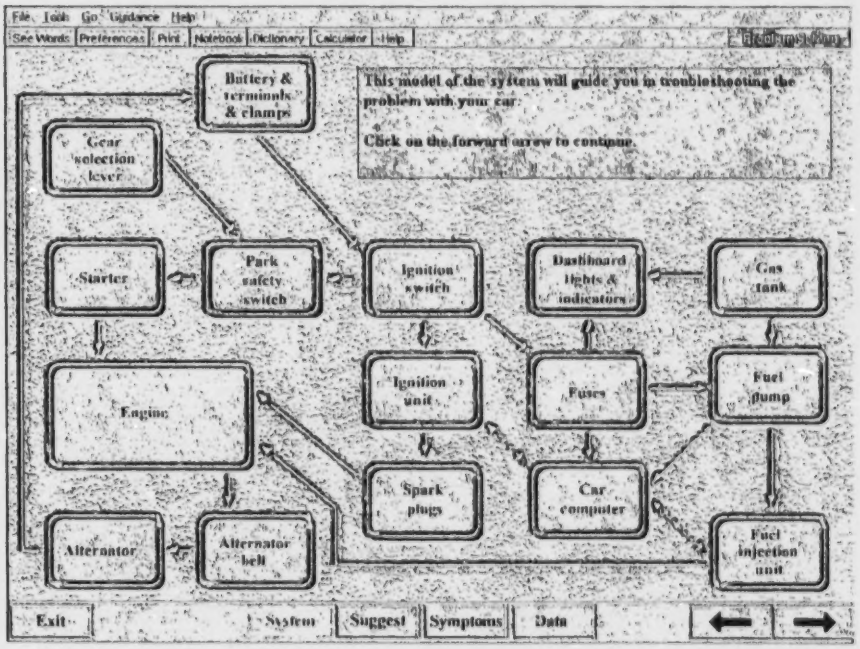

Figure 4.3. Systems model for motor troubleshooting implemented in the *Problem-Solving Experience* from PLATO Corporation.

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Again, the most effective way to learn to troubleshoot is by troubleshooting problems. That requires presenting learners with the symptoms of novel problems and requiring them to solve them. In order to solve problems, a PBLE must provide the following components:

Systems models illustrating the conceptual interconnectedness of systems components—that is, what are all of the components and subsystems of the system in which the problem occurs and how do they influence each other? Figure 4.3 illustrates a systems model of an automotive electrical system. When your car will not start, you may troubleshoot the fault or call the mechanic. The mechanic will troubleshoot the problem without resorting to trial-and-error, serial elimination, or other weak troubleshooting strategies, because he or she knows how the automotive electrical system works. We used the systems model in Figure 4.3 as an interface to information about systems component actions to be taken in the troubleshooter (described below).

Case library or fault database consisting of as many troubleshooting instances as possible. Each case represents a story of a domain-specific troubleshooting instance—the online architecture displayed in Figure 4.4 includes a list of cases on the right-hand side. Ideally, the case library would consist of hundreds or even thousands of cases. Case libraries based on principles of case-based reasoning represent the most powerful form of instructional support for ill-structured problems such as troubleshooting (Jonassen & Hernandez-Serrano, 2002). The case library indexes each case or story according to its system fault, the system or subsystem in which the fault occurred, and the symptoms of the fault. The failure mode indexes hypotheses or strategies that were tested, the results of those tests, and what lessons were learned from the experience. The case library represents the experiential knowledge that learners do not possess; when a question is encountered, the learner may access the case library to learn about similar cases, what was done, and what the results were. The learning system can also be programmed to automatically access a relevant story when a learner commits an error, orders an inappropriate test, or some other action that indicates a lack of understanding.

Troubleshooter that allows the learner to troubleshoot new cases—the troubleshooter (see Figure 4.4) is the heart of the troubleshooting architecture. It requires the learner to take an action, such as ordering a test, trying a repair strategy, looking for system information, etc. Each action taken by the troubleshooter shows up in the systems model. For each action the learner takes, the troubleshooter requires the learner to state or select a fault hypothesis. If the hypothesis is not consistent with the action, an error message is presented. The learner must also identify the subsystem in which the fault occurs. Again, if the subsystem is inconsistent with either the action or the hypothesis, then an error message is triggered. The

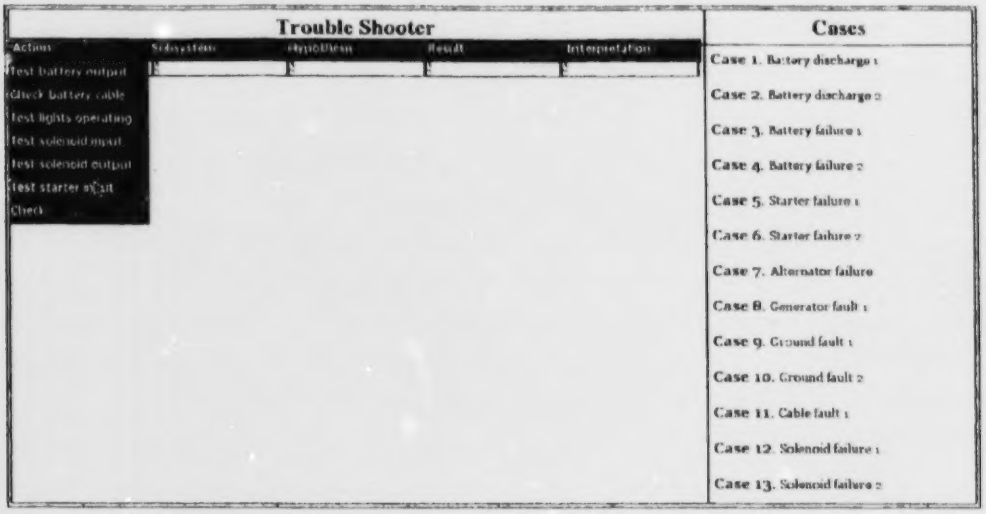

Figure 4.4. Troubleshooter architecture.

learner receives the result of the action (e.g., test results, system information, etc.) and must interpret those results. If the interpretation is inconsistent with the action, hypothesis, or subsystem, then an error message is triggered.

The troubleshooter (see Figure 4.4) requires the learner to think and act like an experienced troubleshooter. The environment integrates the troubleshooting actions, knowledge types (conceptual, strategic, and procedural), and conceptual systems model with a database of faults that the learner and others have solved. Initial instruction in how to use the system is provided by worked examples. As learners solve troubleshooting problems, the results of their practice cases can be added to their case library of fault situations, so that they can learn from their own personal experience. Funding is being sought to implement this architecture and test its effects.

SUMMARY

In this chapter, I have argued that online learning in universities and corporate training should focus on problem solving. In order to support learning to solve problems affordably, problem and domain-specific problem architectures must be implemented in online delivery packages. I have briefly described examples of two such architectures, replete with the required instructional components. Because neither of these architectures has been built, no examples exist. Additional funding is being sought to build prototypes of these architectures. The assumption is clear. We know that there are different kinds of problems, and we know how learners have

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to think in order to solve those problems. The next step will be to construct the different online architectures and disseminate them. That process will engage the greatest problem to date.

The most significant difficulty (a complex problem itself) in promoting problem solving in online learning will be to convince universities and businesses that learners should be learning to solve problems, that recalling and forgetting content is not sufficient for learning to solve problems, and that changes in the basic nature of their pedagogies are required. The dominant models of instruction in most universities and businesses are based on four centuries of practice. Changing pedagogies currently based on traditional, dualistic, and deterministic epistemological assumptions will require systemic changes within the institutions. The educational reform necessary to support those changes in pedagogy represents an incredibly complex and multifaceted systems analysis problem.

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CHAPTER 5

IS THERE ANYONE THERE?

The Embodiment of Knowledge in Virtual Environments

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Is there anybody there?
I am a student on ECT401, is anyone there?
I need to talk to someone
I am one of your students. Can you call me back?
I need to know if there is anyone there?

—Messages left on course voicemail at the start of the year.

ABSTRACT

Discussions about distance learning often assume that the main educational task in moving to teaching in a distance mode is essentially that of putting content into a form through which students can easily access it, learn from it, and have their learning assessed, all with minimum direct assistance. In this

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chapter, drawing directly on my own involvement in writing and teaching distance courses, I describe how I came to realise that distance learning is just as much mediated by social relations and distance teaching is just as much a performance as is classroom teaching. Distance education has a space, a culture, and a set of distinctive work practices. It is different from face-to-face classroom teaching but not in quite the ways that many of us first think.

TEACHING AND THE EMBODIMENT OF KNOWLEDGE

From packed conferences to private conversations,
scholars perform what it means to know things.

—Erica McWilliam

Teaching represents knowledge to people rather as theatre represents life.

—Lawrence Stenhouse

A persistent and continuing issue in the use of computers, across a wide range of uses, functions, and purposes, concerns what is sometimes called the "human-machine interface." This includes technical, design, and usability concerns, but in education, the direct intervention of computers into the learning/teaching process presents a series of more significant questions. The human-machine interface is at the heart of the issue of what education is.

Some of the questions that follow, particularly those involving the notion of e-learning, are much discussed, but the implications for teaching are much less often considered. Can the machine re/displace the teacher? Or provide a platform for a two-tier education system in which a small group of experts write courses and others act as tutors and technicians? Does the web page re/displace the book? Does the e-conference re/displace the seminar and the classroom? Does email re/displace the tutorial?

Often, it is assumed (especially by administrators and planners) that teaching in distance education is more like textbook writing than classroom teaching. In virtual teaching, what counts as teaching seems a simulacrum, a stereotype of "real" teaching. What we see seems often to be a dilution of face-to-face teaching; an absent presence, a shadow of "real" teaching. In this chapter, I take the different view that *all* teaching involves the performance of knowledge and that in distance settings, this gives teaching a particular character and set of practices. *E-teaching* is less often discussed than *e-learning*, but we need to do so if we are to avoid carrying over inappropriate assumptions into new areas of policy, planning, and practice. This discussion is important, since neglect in this area is likely to carry a high cost.

WHAT IS TEACHING?

Teaching, as most of us first think of it, essentially involves individual performance in the context of human interaction. To put it more plainly, when we hear the word *teach*, the images that first come to mind (for many of us) are of a teacher in a classroom. Invariably, the teacher is talking, is on her feet and moving around, perhaps close to a black, green, or white board (there are generational differences here). Meanwhile, the class sits, more or less attentively at desks (or tables) and perhaps with books in front of them and pens (or keyboards) at the ready. If you try this exercise, you will find that there are further parallels, often at a level of considerable detail. Classrooms, for many of us, have characteristic furniture and decoration, a distinctive acoustic, and windows (actual and virtual). They have characteristic sounds and smells, evoke characteristic ways of speaking, feelings, and forms of interaction. Across generations and across cultures, there are forms of writing, drawing, and painting; phrases the teacher uses; distinctive sounds of singing; attitudes to work and feelings of embarrassment; and feelings of pride and failure that we associate with school.

As teachers, we telegraph these images when we talk of "being at the chalkface," of students being "in front of us," of being "face-to-face," of "making eye contact" and "engaging attention," of the "realities of the classroom" and, sometimes, of the "cut-and-thrust" of classroom debate. For behind these phrases lie a whole communicative culture and community of practice.

Most importantly, teaching is generally acknowledged by all of us—teachers, students and parents—to involve performance; to "teach" is in part to *be* a teacher with the connotations just outlined (for instance, of teaching as face work). As teachers, we know the reality of this because we know that maintaining a teaching presence in even a small class can be demanding physically, emotionally, and intellectually. Those new to teaching are often surprised by the concentration and focus that practising the skills of classroom teaching requires and of how tired they get, even when the teaching task seems routine, uncomplicated, and straightforward.

IF THIS IS TEACHING, IS THE DISTANCE TEACHER REALLY A TEACHER?

These opening images of the classroom are, by definition, stereotypical, and they might seem to have no place in a discussion about the nature of distance education. In distance education, surely, there is no classroom (and often no faces). There is no stage on which the teacher can perform, and so, new ways of thinking about teaching and learning are required. In

distance education, the social context within which teachers and students interact is of a quite different kind; the roles are different; the pedagogy is distinctive; the tone, level, and intonation of the teacher's voice changes.

There is some truth in this, yet theories of change tell us that in any social change, there are usually greater continuities than there are transformations, albeit masked or camouflaged. A point I shall return to throughout this chapter is that while I believe that distance education does provide a significant space for rethinking conventional pedagogy, it is not in itself always as different as it might seem. There are many examples of distance programs that exemplify the epithet "innovation without change." Behind the screen usually lie ways of teaching and learning that are not so different after all. There may be no classroom in terms of desks, chairs, and the distinctive smell of bodies and floor cleaning fluid, but there is still a *virtual* classroom implicit in the assumptions that people bring to teaching and learning. The teacher's voice may not be so different after all. It is no accident that one of the most popular, screen-based, software packages for teaching is called "Blackboard."

Teaching requires performance, but there are limits to the metaphor. Unlike most acting, teaching has no script, and under pressure from an active class, teachers may lose control of the plot. Teaching is, though, similar in many respects to performance in other settings: the theatre, musical performance, and sports. It is similar in that it has both a frontstage and a backstage: a site (a location, time, and circumstance) of enactment and a technical place where that illusion is planned, trained for, created, and enabled.

GOING BACKSTAGE

If you walk through a school after hours, the backstage to the classroom is not immediately obvious. There are staff areas and science prep rooms that fit the bill, but there are few areas in schools that are physically and culturally off-limits to the audience. The real backstage to teaching is not so much a physical space but a space in teachers' lives. The backstage to the classroom, which Philip Jackson once called the "pre-active" as opposed to the "interactive" phase of teaching (Jackson 1966), is where we mark students' work, assemble slides, attend workshops and meetings, talk with parents, make curriculum decisions, research resources, and reflect on what we are doing. It is where we generate energy from aspiration and harness it to the preparation of lessons and classes. Though sometimes left out of account (especially by students and parents), this backstage is the engine room of the classroom.

Despite the crucial significance of pre-activity for teaching, most of us who are not teachers see it as subsidiary, as a rehearsal or precursor to performance. What really counts, we believe, is the actual moment of exposition, recitation, or interrogation of students in the lecture hall or the classroom. When we are asked to evaluate teaching, it is almost always the interactive phase of teaching that we consider first. When novelists, filmmakers, and journalists think of teaching, it is classroom images of charismatic teachers that they invoke, and because teaching has this charismatic, mythic quality, these teachers of fiction tend to exemplify extremes of cruelty, love, self-sacrifice, or self-delusion.

THE PEDAGOGIC SWITCH

When I first began distance teaching (before students had computers and when using the telephone or the video was thought of as innovative—and was expensive), former colleagues would often say to me, "I couldn't do that, I would miss teaching too much." What they meant, of course, was that they would miss the feeling of being at home in the classroom, of having a teaching presence in it, and of being face-to-face with their students.

Given these expectations, my experience proved to be counterintuitive. What I found was that distance teaching too required performance, but of a more subtle and complex kind. To continue the analogy, it was more like acting on film than in the theatre (sometimes literally so). In distance education, teaching has to be carefully planned, staged, and organised. A great deal of effort goes into preparation. There is more than one chance to get it right. There are chances to edit, but once down (in text, on tape), the classroom text has a degree of permanence and immutability. Teaching at a distance is a game with high stakes.

I discovered too, what many distance teachers know, that it is a mistake to assume that physical distance means loss of intimacy in interaction. Many commentators and policy makers assume that distance education is essentially inadequate because it lacks the physical co-presence of teacher and student. Often, of course, this is an implicit reference to an ideal model of teaching that has little basis in current realities. A lecture theatre with several hundred students, a seminar with perhaps forty, and a tutorial with ten, or a lecturer and students stressed through overwork, are already some distance from the implied ideal. But there is a more fundamental error at work in this argument. Paradoxically, distance education can bring student and teacher closer. Just as the telephone or email provide space for particular forms of intimacy that are not easily replicated or can be sustained face-to-face, so too in distance courses, students and teachers can get to know one another very well albeit within a fragile virtual world.

In time, puzzling over these incidents and encounters where I found myself overtaken by this capacity of the media, I came to realise that in distance education there is a significant pedagogic switch. In this switch, what Philip Jackson called the "pre-active," moves to the stage, and the performance moves behind the scene/the screen. The interactive phase, which was formerly dominant, switches from figure to ground. As the lecture dissolves and the text comes to predominate, much of what was formerly off stage and hidden from the audience becomes visible and more open to inspection. It is almost as if the conscious and the unconscious switch places.

The effect of this pedagogic switch is that teaching is seen to turn inside out. In distance education, much of what is conventionally backstage can be brought to the forefront (the teacher's notes, personal library, and scholar's desktop), and the front-stage (the lecture, the exposition, the setting itself) can move backstage. In an advanced stage (to complicate the metaphor), the course may come to be about itself, as process becomes content, the illusion of teaching as performance is broken, and the audience becomes the play (the curriculum).

FROM THE STAGE TO THE PAGE: THE TEACHER IN DISTANCE EDUCATION

You might think, from the way I have described it, that distance teaching is more like textbook writing than classroom exposition. In one sense it is, in that it demands a grasp of detailed knowledge, the ability to sequence it, and a "big picture" that holds it together, but getting the content right is not the whole story.

When I first became involved in distance education, I was surprised when students asked, "Is somebody there?" for I took the question to carry overtones beyond the simple inquiry it seemed to be. It sounded (and I think it often was) a plea, not just for information but also for contact, for human presence, but I was puzzled because as the teacher (and course writer), I had thought there was more of me "there" than in most of the conventional teaching that I had done previously. In preparing distance courses, I felt, like many of my distance education colleagues, that I had been better able to get my thinking down on the page than in any lecture I had given or in any book or paper I had written. I felt able to move the students more quickly to the cutting edge of the field. I had, of course, benefited from the critical comments of the course team and other colleagues. The text editor kept me more honest than I probably was in most lectures. The curriculum was consequently more direct, took a cleaner line, compromised less, and offered students a contemporary and well-informed

view of the field. I felt pleased with what I had done in part because it was so carefully worked, but also because it was personal.

Yet, at the back of my head was still the voice asking, "Is anyone there?" It was as though the students were sitting before an empty stage waiting for a performance that was not there, even though they had in front of them the books, the video, the audiotapes, and the CD-ROM, all they needed in fact to make their own play.

My first thought was that academic styles of writing were part of the problem, and the next step I took was to personalise the material (to "re-face" it). I set out to write in plain and direct English and to select texts for their lucidity as much as for their reputation or currency. I made videotapes in which I talked to the students about the course and included the kinds of asides I might have included in a lecture or seminar. I also made audiotapes in which I and others in the course team talked to the authors of the texts that students would encounter in the course. I made unscripted commentary tapes in response to the assignments that students submitted, taking as an aspirational model Alistair Cooke's weekly broadcast, *Letter from America,* in which he talks informally about serious topics.

The intention was (to use a phrase current at the time) to "break the grip of print," which I took to mean including the student in the curriculum pre-world of discussion and emerging ideas that lay behind the finished production of course materials. What was missing in the perfect texts that they had been sent, I believed, was an understanding of the process that had produced them. So, it seemed important to give them a sense of inclusion in the world of academic work and to provide a degree of intimacy with the academic workplace and academic debate that was denied them in their formal role of audience for those materials.

It is so easy to write of these things, and it was so hard to do! In the course team, we all found talking to a camera especially difficult. The classroom performance/persona that is so natural to us does not work on video. We wanted to seem natural, more conversational, but we felt ourselves acting stiffly and formally. We looked away when we should have looked into the lens. We tried to smile, but when we did, it mostly looked false. We stood, sat down, walked about. We tried scripts and using an autocue, we tried conversation, we improvised, we tried studio recording, and we filmed on location. Slowly, we learned to talk in 15-second, 30-second and 60-second takes (rather than 30-second takes that actually ran 5 minutes). We found that being actively involved in the editing of the tapes and spending days sitting with a professional editor began to teach us a little about how we could use the medium.

We persevered because student feedback was so positive. They forgave our amateur performances. They said that it was so nice to be able to see the person who had written the course, who would mark their assignments,

and to whom they talked to on the phone or contacted by email. They liked the audiotapes because they provided a relief from reading and because they could listen to them as they drove to work. They said they felt they knew us. They liked to be able to put a face to a name. They said that this made such a difference, and the emails, the phone calls, and the writing they sent all reflected this. Several times students stopped me in the supermarket or the fish and chip shop and said to me, "I know you, you're my teacher."

CHANGE IS AN ARROW THAT DOES NOT FLY BACKWARDS

Nevertheless, students did not all find the adjustment easy. Some students resented the demands that the changes made on them and wanted to return to the well-worn pattern of reading and essay writing. This pedagogic algorithm for distance education, which so often dominates distance courses, echoes the pattern of recitation that is so persistent in proximal teaching. In this pattern, students felt familiarity; they knew what was expected of them; they were able to manage their time effectively and produce outcomes that provided a sense of progression and achievement. "I don't want this course to change my life!" said one particularly critical, and perceptive, student. Academics also found the conventional pattern one that they could manage as a set of pedagogic routines; some of them did not want their lives to change either.

But once started, we found that we could not stop. Having started to do some small things differently, we began to change the way we taught and the way we thought about teaching. We did a lot of research, but research of a different kind. I apprenticed myself to a radio producer and made a number of radio programs in an attempt to become more effective in, what was for me, a new oral/aural medium. One member of the team, Ron Lewis, picked up on part of the course that was about the use of space in classrooms and spent several months attached to an architectural practice as they worked on the design for a new school. Another team member, Helen Modra, whose interests were in literacy and student writing, changed her PhD topic from a more conventional distance education study to investigate "silence." Her theme was that "Educational theory, if distanced from experience, positions silence as a problem rather than as a site of possibility" (Modra 1998). Helen's thesis investigated the experiences of silence in the lives of a wide range of educators, including a composer, a novelist, a meditation teacher, an Orthodox priest, a high school teacher, an Anglican priest, an actor, a grief counselor, and a university lecturer. She concluded that "focusing on silence as experience, ... suggests new ways of enriching

pedagogical practice." In the conventional classroom, silence is often treated as a nonproductive category (hence the "time-on-task" literature) despite a long tradition of meditative practice in many cultures. In distance education, the notion of silence takes on new meanings, and demands new forms of practice and revisiting educational values.

We learned a lot from one another. A colleague visiting from another university said, "what I always notice when I come here is that I never see you alone, there are always groups of you together!" In different and often unexpected ways, these changes in the way that we worked played back into the courses that we taught and particularly into the way we were (and I suspect, are) as teachers. They may have played back into the way that this paper is written. I don't think I would have written it in quite this way before I became a distance educator.

THE PEDAGOGIC SWITCH AND THE CURRICULUM

Just as curriculum may be transformed by pedagogy, so the pedagogic switch changed the curriculum of distance learning. The explicit curriculum and the informal curriculum began to crossover.

Much of what is off-stage in conventional teaching, for instance, discussions with academic colleagues, conversations with students over coffee or at lunch, and talk "about" the course as opposed to what was "in" the course found its way into the curriculum of the distance course. One paper that we included in our readings we printed (with the author's permission!) in draft form, complete with his handwritten annotations. The course editor assumed this was a mistake and offered to tidy it up for us, but we wanted it untidy! We wanted students to have a glimpse behind the scenes of academic life and for a moment to suspend their belief in its perfection.

Assessment, which is normally seen as a technical matter, clipped on to the course as a set of routines and procedures, became an integral part of our course. We made assessment part of the curriculum. We argued from a set of principles for a particular approach to assessment rather than making assumptions or arbitrary decisions. We made the course task-based and used tasks to drive the curriculum, rather than the other way around. We set tasks that made different demands on students and were amazed at their willingness to try out our wildest ideas.

We began to think of the curriculum of distance education as needing to include material that is left to informal processes in conventional teaching. We increasingly saw the importance of giving access to the working culture of the course team and to the academic "invisible" college beyond the institution. We focussed less on teaching specific content and more on giving students a sense of belonging to a culture of scholarship and research.

We did this, in part, by reshaping the assessment process, dismantling summative assessment and replacing it with sequences of research-based tasks. We did this, in part, to shift the onus of assessment from the teacher to the student, to reduce the dependency of the student on the judgement of the teacher, to give to the student the grounds on which to make his or her own judgments about the quality of the work. None of this was easy, and often we failed; but we did not give up, and we kept trying.

THE PEDAGOGIC SWITCH AND DISTANCE LEARNING

Sometimes, it is said that teaching is the mirror image of learning—or more accurately of "studenting," for learning is but a small part of what students do in class, just as teaching involves much more than the presentation of knowledge.

The assumption is that we cannot teach in an empty space and that teaching only exists when someone is being taught. To be a speaker requires a hearer. The student may not be present in the same space or at the same time as the teacher, but without an active and engaged student presence, teaching cannot exist. Teaching that lacks a specific and identifiable audience is not really teaching; it might be technical or religious instruction, political propaganda or health promotion, but it is not teaching.

In this argument, it is interaction that essentially defines teaching. In particular, it is the opportunity for the student (and the teacher) to question, to challenge, to listen and reflect critically on what is said, and ideally, to be able to test ideas to destruction. As a consequence of such interaction, teacher and students come to know one another, and such knowledge is an identifier of teaching. Good teaching reveals to people (teachers and students) how they each think. The teacher we are becomes the person we are.

It is mainly in the interactive phase that what we teach becomes embodied in us as the teacher. Teaching always involves a selection of content, method, and approach from a wider range of possibilities and so is not neutral but inextricably tied to principles, beliefs, and values. While we might attempt to argue objectively and with disinterest and to encourage students to do the same, we know, at heart, that theories are not simply infinitely interchangeable sets of ideas but are often deeply held and resistant to rejection. Teaching is not just a matter of giving a competent performance or a demonstration—a limited technical activity that requires certain skills. In order to teach, we must become the teacher. Teaching is not only a task, or even a role; it is an identity, and it invokes values. In order to teach effectively, what we teach must come from within us. "Teachers," Lawrence Stenhouse, once wrote, "express knowledge to people," but he did not mean by this that teachers only express knowledge. Teaching is a

serious and demanding intellectual task "not to be regarded as a static accomplishment like riding a bicycle or keeping a ledger; [teaching] is, like all arts of high ambition, a strategy to be adopted in the face of an impossible task" (cited in Rudduck & Hopkins, 1985, p. 124).

If teaching is defined in these terms, as the failure to fully achieve aspiration, and if it is also essentially an expressive performance, then this creates the ground on which particular forms of personality and ways of thinking and being in the world will grow. The teacher we are becomes the person we are.

What this implies for learning is that there is necessarily a degree of identification with the teacher by the student. The student does not simply "learn," but (almost always) learns *from* someone, which implies for the teacher that they need to become someone from whom it is possible to learn. The learner too must take a part in a particular psychological drama: just as being a child requires you to be part of a family, being a student requires you to be dependent on a teacher.

There are, of course, many things we learn that we learn in a less socially embedded way, though I think there are fewer of these than we might at first think. Learning from books, video, or personal correspondence is just as much learning from someone as learning in a classroom. Most learning of skills is learned from modeling and practice, not practice alone. Seeing someone else do it and maybe hearing them talk about what they are doing is one of the most effective learning systems we know, whether we are learning a laboratory technique, how to play a musical instrument, another language, a software package, a recipe, how to fish, or how to drive a vehicle. It is a myth that we can just as easily learn these things alone through some disembodied and codified instructional process. Ten minutes spent with the instruction booklet for a video recorder is usually demonstration enough that the process works best when humanly mediated (when someone shows us how). Or, to invoke a contrary image, think all the TV cookery that is as much about the cook as it is about realising recipes.

In the way we teach, we provide a point of access, not just to what we think, but also to how we think, which is what makes teaching personal and individual and not fully reducible to training formulae or to style. One consequence is that often learners come to feel dependent on their teacher, especially at the start (Salzberger-Wittenberg, Henry, & Osborne, 1983). They may respond to this feeling of dependence in different ways (including disaffection) but for them to work to a point of autonomy requires effort, intellectual and emotional.

IS DISTANCE TEACHING THE *REAL THING*?

In distance education programs (and increasingly in teaching in virtual environments), we almost always face an initial sense that the course will somehow be "less than the real thing," simply because distance seems to make human mediation difficult. Despite what I have said, from the outside, a course mediated through texts, tapes, telephones, and screens somehow seems a pale shadow of courses taught in classrooms and lecture theatres—however poor the performance of the lecturer, the organisation of the material, or the content of the curriculum.

Many distance education programs assume that the deficit they face in trying to make distance education *real* involves interaction, and they invest heavily in forms of presentation, which build interaction into courses. This may take the form of simple quizzes, telephone tutorials, computer conferences, or the range of interactive software increasingly available. Anything that makes text more engaging is seen to be a good thing, but to change only the surface appearance of the text is a mistaken turn. It always seems false when the computer asks you for your name and then uses it to address you, to personalise its instruction (even though humans act very similarly). There may be other good reasons for designing greater interactivity into teaching (proximal and distant), but to assume that the key technological issue in distance education is to develop better forms of interaction, I think, takes us away from the point.

What characterizes the simultaneous presence of teacher and students in the classroom is not interaction but presence. In the proximal classroom, presence is hard-wired; in virtual classes, we have to find other ways. You might, as we did, use other media, or you might try forms of text that are more engaging. It would be interesting to develop a distance course based on personal correspondence; within an email chat room; or by exchanging audio- or videotapes, weblogs, or photographs. These other ways each carry their own values and ways of being in the world; each offers a different way of providing a space in which to present knowledge; and be present in knowledge, and each offers a different way of learning and of knowing what it is to learn. But what counts is commitment and engagement in the exploration of ideas (the engagement of students and teachers). Too often, distance education is seen as providing a way for students to scale down their commitment (and still qualify) and teachers to manage their teaching commitments and still do research. The issue is not inherent in the nature and practice of distance education, but in the way we are tempted to cut corners because we face other demands on our time.

THE DEMISE OF DISTANCE EDUCATION

In what I have written to this point, I have looked at the differences between distance education and face-to-face teaching in terms of the different modes of performance that each requires. This discussion assumes a binary distinction between the two educational forms (of distance and proximal teaching) that is institutionalised, an assumption that is increasingly precarious. Increasingly, the issues in education are not about its form but about the directions that universities have taken in attempting to accommodate government policy.

Otto Peters (2000), one of the major theoretical commentators on open and distance education (ODE) over many years, has recently written of the demise of distance education. Peters does not argue that distance education no longer exists but that it is losing its identity as a distinct category. In the contemporary university, he argues, there is a growing convergence between conventional and distance education and that, rather than being marginal to the university, distance education is increasingly becoming part of the mainstream. Just as every university now has a website to support its student recruitment activities, nearly every university has some involvement in offering courses online to distant students or through some form of off-campus provision. Peters argues that as universities become instruments of mass education, as higher education consequently becomes politicised, and as information technologies increasingly transform curriculum, teaching, learning, and assessment, mixes and hybrids of ODE and conventional teaching, in the form of "flexible delivery," become dominant and ubiquitous.

As politics press universities to adopt forms of teaching that combine distance and proximal approaches, Peters argues, the key distinction that emerges is not that between ODE and conventional teaching, but between teaching and research.

> In German universities, teaching continues to have a lower priority than research. Lectures, classes, seminars, and periods of practical training are usually overcrowded. There is a general lack of support services for students. The jungle of courses, degrees, and examination requirements ... means that students are faced with almost insurmountable problems (Peters, 2000, p. 10).

Peters is clear that in current circumstances, the separation of ODE from the mainstream can no longer be sustained, and in the future, the successful university will be one in which the two models coalesce. This leads him to argue for placing teaching itself as central to the role and function of the university.

> Teaching must not continue to be peripheral, carried on by the incidental interests and activities of some members of the middle hierarchy. It must be made into an essential task of the university that is taken up in the first place by all university teachers (Peters, 2000, p. 12).

The issue, Peters identifies is that in the contemporary university, the challenge is less about debates between forms of teaching and more about the relationships between research and teaching. This has particular relevance in the context of the argument I developed earlier, that distance education creates the basis for a set of distinctive pedagogical practices. If this were so, then it would seem likely that distance education would relate to research in different ways. Critically, it will provide ways of thinking about research-led teaching that might not occur (or be feasible) in the proximal context. For a conceptual and educational analysis of the notion of "research-led teaching," see the report written by Zamorski (2000).

IN DEFENCE OF VIRTUALITY

Otto Peters's predictions are fast becoming evident. The nature of teaching in universities is changing almost everywhere. In the UK, we are attempting to manage a large increase in numbers (the government aim is to have 50% of school leavers in higher education from a base of around 30%); there is little expansion of resources and the building stock is aging and often inappropriate to current needs. We also face a major staff development problem, since university teachers have not been trained to teach in the past, and their careers (as Otto Peters points out) are dependent more on their research than on their teaching. Pay rates too are relatively lower than in schools. "Teaching" is also changing in training settings and in commerce, the public services, and in industry. Almost all pedagogic assumptions need to be rethought.

In terms of learning technology, universities everywhere are rapidly expanding access to courses, and academics are enhancing their teaching programs through their use of the Web. We have moved past the point of seeing web pages as additions to reading lists and increasingly incorporate them in class activities. They are used not just for text storage, but also increasingly for other things—for web-casts and conferences, as virtual learning environments (V/MLEs), to manage discussion and other group activities, and to access the growing public resource base now available (e.g., in the UK, from JISC projects). In actuality, we are rapidly dismantling the conceptual distinctions between distance and face-to-face teaching, leaving much of the previous debate stranded and simultaneously

creating the ground for new debates around the possibilities of realising alternative pedagogies.

THE DEMISE OF THE CLASSROOM

Technically and practically, there is ground for claiming that the classroom, as a physical, educational, and emotional space, is under erasure. We do not need it anymore; it continues to exist only out of organisational inertia and because universities have invested in concrete spaces and tools; in rooms, furniture, display systems, timetables, and people. Dedicated distance organisations (the many open universities around the world, the School of the Air, and many in-house training programs) suggest that there are gains to be made in thinking (and acting) outside of this frame. What we fail to understand are the educational implications of this shift.

In rethinking the classroom, a key element concerns the role of the teacher. The default position seems to be that distance teaching requires only the addition of a few skills not already in the repertoire of the conventional teacher. That once in place, most distance courses can run in a high-volume/low-maintenance mode with tutorial and technical support alone, provided an efficient administrative system is in place. This model, sometimes referred to as the "OU Model" after the very successful (and often highly innovative) programs developed by the UK Open University, but the assumption that such a model can be implemented by providing some technical support to conventional "trained" lecturers is questionable. Implementing a distance program requires new forms of pedagogy, though these are not always fully recognized and are less easily replicated than is often assumed. Those implicated need time and resources as well as technical assistance to make the changes that this requires. If the classroom becomes virtual, an organizational infrastructure is vital to make educational programs work. There is no space for amateurism and lack of supportive infrastructure (dedicated library, study support, student records, and admissions). In a distance education institution, all is visible, and there are no places to hide.

We need to remember that the *classroom* is not a free-standing social construct. Behind the idea of the classroom lie other concepts and ideas, in particular the notion of simultaneous instruction, a particular view of the curriculum, and of what it means to learn as well as to teach. David Hamilton (1989) has explained how the classroom emerged in the 19th century as a constellation of solutions to problems of the time that have since become endemic to our thinking and implicit in our language. Some of these ideas and concepts are architectural, some educational, and some social (*Classroom* derives from *classify*, *standards* from the flags at the end of

the *forms* on which pupils sat, *curriculum* probably, from the racetrack of Greek antiquity). Such notions are not shifted by technology alone but by significant, concomitant social change. In thinking about ways in which education may be changing and in moving to adopt new sets of practices and new forms of interaction, we are necessarily drawn into thinking about social change. When students ask if someone is there, they are partly asking from a sense of social dislocation, from being caught up in the process of social change and being personally troubled by the experience. What they want is not simply an organisational response, but access to the means of understanding their circumstances and the capacity to act in new ways.

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CHAPTER 6

REVEALING THE HIDDEN CURRICULUM OF E-LEARNING[1]

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ABSTRACT

This chapter defines and overviews the conceptualization of the "hidden curriculum" as it has been developed in the writings of educators over the past 50 years. It then looks at distance education, and in particular the omnibus set of distance education delivery modes known as "e-learning." Does e-learning conceal a distinct hidden curriculum that is different from campus-based delivery of formal education? Using Ahola's (2000) four dimensions of the hidden curriculum, I examine e-learning and conclude that indeed it does contain a hidden curriculum. However, this hidden curriculum has both advantages and disadvantages for learners for different reasons. The article concludes by calling for an unbiased and fair evaluation of the strengths, biases, and hidden agendas of this newest form of education design and delivery. Such analysis reveals that e-learning has a unique and valued place in the array of educational systems built to serve the diverse needs of students in a distributed world.

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DEFINING THE HIDDEN CURRICULUM

The term "hidden curriculum" has circulated with great intuitive appeal among educators for the past 50 years (Gordon, 1995). The term seems to be defined as much by the author's lurking suspicion of conspiracy or secondary agendas as by any single or precise definition. There seems to be at least three primary ways in which the term "hidden curriculum" is used in education and social science literature. First, the term has been embraced by critical researchers referring to a variety of forms of indoctrination and cultural inculcation imposed along with the formal curriculum of education systems. Examples of this sense of hidden curriculum include political and class reproduction (Apple & King, 1977; Ehrensal, 2001; Illich, 1971), reproduction of gender stereotyping (Curry, 2001; Frazier & Sadker, 1973; Goulding & Cleeve, 1997), use of adult education programs to condition the expectation of unemployed workers (Muzzin, 2001), and the imposition of technology into educational systems (Noble, 2002; Winner, 1997). Second, the term has been used to refer to the effect of the setting in which formal education occurs, usually focusing on a particular context—often the bricks and mortar of school campuses and the ways in which the environment conditions the activities and learning that take place within it (Gair & Mullins, 2001; Gordon, 1995; Orr, 1966). The third and earliest use of the term refers to the socialization that students are subjected to as they learn to cope with the institutionalized requirements of formal education systems. Jackson's (1968) work in which he redefined the three Rs of school education as "rules, routines, and regulations" is usually credited with the first use of the term hidden curriculum. Snyder's (1970) classic book first discussed the hidden curriculum in higher education. He describes "a hidden curriculum which to a great degree is the way in which the various participants played the game, read the cues, and adapted to their immediate educational circumstances" (p. xii). Perhaps the most descriptive definition is that provided by Sambell and McDowell (1998) who define hidden curriculum as "an apposite metaphor to describe the shadowy, ill-defined, and amorphous nature of that which is implicit and embedded in contrast with the formal statements about curricula and the surface features of educational interaction"(p. 391).

Although the term *hidden curriculum* has connotations of intentional obfuscation, Gair and Mullins (2001) refer to the hidden curriculum as "hiding in plain site" and argue that often "the hidden curriculum is not something that we must look behind or around in order to detect; in most cases, it is plainly in sight and functions effortlessly" (p. 23). As Edgar Allen Poe noted sometimes the best place to hide something is in plain site, where we are not looking for it.

Regardless of the multiplicity of meanings of the term, investigation research, and writing about the hidden curriculum, the study of the concept is inevitably motivated by a unitary goal—to make explicit and visible that which was formerly invisible. The aim of hidden curriculum research is to reveal and make manifest these undisclosed agendas of formal education. Theorists, reformers, and apologists all agree that once revealed, the hidden curriculum becomes negotiable and visible to all participants (teachers, students, and society in general), allowing for remediation, change, defense, improvement, and informed dialogue related to the education process and structure.

The multiple meanings ascribed to the concept of the hidden curriculum provide evidence for an understanding of the term as defined by particular circumstances and by the lens or worldview of the beholder. In this chapter, I take a somewhat defensive and arguably, sympathetic interpretation of the hidden curriculum in regards to e-learning. I am sure that a growing list of critics of e-learning (Noble, 2002; Winner, 1997) would disagree with my interpretations and challenge my conclusions and bias. I welcome this debate. I think it is important for these issues to be revealed and the hidden assumptions of all commentators be examined in as open a forum as possible. What is required to reveal the hidden curriculum is a capacity to critically look inward at ourselves and the institutions that we have created and that have in turn created us. I hope this chapter adds to this revelation of the hidden curriculum of e-learning.

The term hidden curriculum has rarely been used in conjunction with distance education, much less e-learning, though I argue that the unique physical and interactional context of these place and time shifted educational contexts give rise to very different conceptions and experiences of a hidden curriculum. This chapter begins a discussion of the hidden curriculum focusing on the social impact of mediated interaction between and among students and teachers engaged in formal education delivered at a distance over computer networks. Not only is the definition and connotation of hidden curriculum multifaceted and at times confusing, but so to is the definition of distance education and e-learning.

DEFINING DISTANCE EDUCATION AND E-LEARNING

Distance educators have enjoyed arguing for some time over a precise definition of their specialized form of education. To this linguistic and functional debate, words like distributed education, e-Learning, online learning, and open learning are being added to update the pre-electronic notions of independent correspondence study that defined the earliest generations of e-learning. The defining characteristic of these diverse defi-

nitions is the separation in geographic or temporal space among teachers and students, engaged in a formal education process. This definition implies that some type of technology mediation is necessary to span that distance. Note that this definition of e-learning excludes self-directed study such as investigating a topic of interest on the Internet since this informal study is neither authenticated, nor credentialed by a formal education body or authority. This definition encompasses a wide variety of forms, styles, methods, and modes of display and communication used to support the teaching and learning transaction—from webcast courses to independent correspondence, to collaborative learning in a teleconference, to asynchronous study in a computer conference, to immersion in a virtual reality learning environment.

It has been popular to describe distance learning in its various generations each of which is associated with particular technologies (Garrison, 1985; Taylor, 1995). However, the convergence of media in digital form on the Internet, makes these type of technological differentiations only of historical interest. The Internet currently supports the first generation technology of print and written correspondence between teachers and students via email. It also supports the second generation of broadcast media through audio and video streaming. Third generation audio and video conferencing is becoming increasing common through various forms of synchronous and asynchronous video and audio-based IP telephony. Fourth generation (Lauzon & Moore, 1989) distance education systems that combine computer assisted instruction and human interaction are supported through server and browser-based processing to create a variety of e-learning contexts including immersive-type virtual environments. So called fifth generation systems (Taylor, 2001) in which intelligent agents are used to assist and augment presence of students, teachers, and even content in e-learning are now appearing (Anderson, in press). All of these "generations" are merging into a smorgasbord of teaching, learning, and communications tools and contexts known popularly as e-learning. Despite our fear of a vengeful visit from the *Society for the Preservation of the Other 25 Letters*, I will continue the overused practice of adding the "e-" prefix to nouns and refer in this chapter to network-based distance education in its many forms as e-learning.

THE DIMENSIONS OF THE HIDDEN CURRICULUM

Ahola (2000) discusses the hidden curriculum concept in four dimensions. I find the delineation of these related, but not orthogonal dimensions, as a useful way to unpack the vagaries of meaning of the term. Breaking the omnibus term into its dimensional components also helps us to infer the

term's applications to the specific e-learning context. These dimensions are learning to learn; learning the profession; learning to be expert and learning the game.

Learning to Learn

Participants in all e-learning programs need to master a set of educational and communication technologies, since interaction in this context is, by definition, a mediated process. The degree of sophistication of these technologies varies from posting an e-mail letter, to participating in an audio teleconference, to being immersed in a virtual reality environment. Thus, learning in a technologically mediated context forces students to become competent and skillful users of a variety of technological tools. Furthermore, the ways in which the tools' use is scheduled and coordinated require users to master personal, time management, and organizational skills associated with functioning in a time and place shifted context. In addition to the standard classroom learning activities such as reading of books, attending to lectures and discussions, conducting library searches, and the mastering of tools associated with creation of projects and papers (word processing, graphics, and presentation tools), e-learning students are forced to master communication technologies such as video conferencing, audio conferencing, computer conferencing, fax, email, and in some cases, sophisticated collaboration and virtual reality tools such as MOOs, MUDs and collaborative workspaces.

Ready access to such tools is the most visible layer of the hidden curriculum of e-learning. Evidence of a digital divide (National Telecommunications and Information Administration, 1999; Reddick, 2000) documents access inequalities based on family income, formal education level of parents, and other indicators of social economic status. Fortunately, there is early evidence of reductions in differences in participation rates in Internet-based activities based on age, gender, and social/economic status (Angus Reid, 2000). Regrettably, however, simple access to generic Internet services such as email masks differences in the quality of these interactions. An ever-rising technological bar restricts access to multimedia, broadband resources to those with newer, more expensive machines, assorted peripheral devices such as scanners and video cameras, and to those living in areas where there is affordable access to the high-speed networks. In addition, continuing barriers of access for handicapped students remain problematic (Center for Applied Special Technology, 2001).

Beyond physical access lies competency with the tools. Manifest differences such as typing speed and access to tools that are both more powerful and easier to use, are compounded by latent differences amongst students

related to attitudes and phobia towards technical tools and processes (Bowers & Bowers, 1996) and personal differences in Internet efficacy (Eastin & LaRose, 2000). Most of us are acquainted with individuals who are uncomfortable with technologically mediated communications tools or who have physical, political, or religious rationale for not acquiring either the tools or the skills necessary for their use. These learners have willfully or coercively been cut off from a growing body of educational opportunity and investment of public resources. The technological component of the hidden curriculum of e-learning thus can become a significant barrier to participation, and surmounting this barrier becomes a hidden curriculum.

This dimension of the hidden curriculum of e-learning assumes that students have both physical and psychological access to technological tools. Revealing this hidden curriculum requires institutions to be explicit about such requirements and to provide alternatives and "work arounds" for those whose access is limited. Obviously, this requires educators to be informed of the technological capacity of their student body, to provide self-assessment activities for students to gauge their capacity to learn in this environment, and to provide high quality training and student support services when remediation or initial support is required. None of these services are inexpensive, and all must be integrated within a system of e-learning provision (Moore & Kearsley, 1996). This is especially problematic in "dual mode" institutions that must duplicate the support services provided to on-campus students, even though the numbers of students and capacity to provide the necessary services at high quality may not be cost-effective (Bates, 1999).

A second component of the "learning to learn" dimension of the hidden curriculum in e-learning refers to the capacity to learn outside of a paced and structured classroom context. E-learning comes in many formats, and the skills necessary to learn are directly related to the instructional, cultural, and technological design of the e-learning program (Garrison & Anderson, 1999). For example, the personal and technical skills to participate effectively in a video conference classroom at remote campus are far different from those required to learn effectively in self-paced instructional formats supported by websites, email, or online-based forms of computer assisted instruction. However, what is common to all forms of e-learning and a significant component of the hidden curriculum is the absence of close, face-to-face contact with peers coupled with a general reduction in opportunity for both formal and informal student-faculty interaction (Mook, 2000). There is growing evidence that close and personal interaction is both possible (Walther, 1996) and experienced when accomplished users communicate using a variety of telecommunications devices (Rourke, Anderson, Garrison, & Archer, 2001; Turkle, 1995). However, nearly all e-learning students come from a background of classroom

education, with deeply ingrained models of in person peer groups, teacher directedness, and paced delivery and evaluation. E-learning models that depart from these norms create hidden curricula that compel students to "learn to learn" in different ways as well as in different contexts. A variety of familiarization and self-assessment programs have been developed to help students acquire these skills and are often incorporated into well-designed e-learning programs. However, the current rush to create online programming tempts institutions, teachers, and students to emphasize the equivalency in a host of factors of distance and campus-based education, thus obfuscating rather than revealing the hidden curriculum of e-learning.

Learning to learn in an e-learning context may also require students to adopt more individualistic and self-motivated attitudes towards their education. Robbins (1997) examined the dimensions of intercultural differences identified by Hofstede (1991) and noted the effect of the individualistic collectivism dichotomy among different cultures and the effect of these differences on distance education programming. He argued that the majority of distance education theory and practice has originated in cultures that value individualism as opposed to those in which an individual's self-identity is dependent upon identification with a group. Thus, a form of hidden curriculum is identified in e-learning that prejudices individualism over inter-group and interpersonal connectivity. This argument presupposes older generations of distance education based upon independent study, but even in more group-oriented modes of e-learning, the physical isolation requires learners to work outside of the physical community, which is at the root of traditional cultural activities including formal education. E-learning may force an approach to learning based on individualistic values that may advantage different cultures unequally, creating a culturally defined form of the hidden agenda.

Learning the Profession

This dimension of the hidden curriculum is most apparent in preservice programs in professional faculties and technical training programs, but it is also ingrained (especially at senior levels of study) in all postsecondary education. Learning the profession begins with acquiring the competencies and technical skills associated with performing tasks required of the discipline or profession. However, an equally important component of professional education includes providing opportunities for interaction and acquisition of the attitudes, norms, and "expert thinking" that defines professional practice in the field. E-learning has inherent advantages in revealing this dimension of the hidden curriculum in that most e-learning students are studying part-time and many are active within established professional communities—

thus, their education is grounded in opportunities for "reflection in practice" (Schön, 1991). There is, however, a growing trend for on-campus students to enroll in one or many e-learning courses and an equivalent trend for students to complete full degrees at a distance in fields to which they aspire but in which they have had no direct experience.

Two strategies have been utilized by on-campus schools in response to the need to "learn the profession." The most widespread is through incorporation of additional cooperative education programs and provision of out-of-class opportunities for professional socialization (McKinney, Saxe, & Cobb, 1998). Although it is possible for e-learning programs to provide equivalent cooperative programs or out-of-class activities, in our experience, e-learning faculty find it more difficult to arrange for and support the placement and provision of such activities when the students are widely dispersed—beyond the physical network of professionals and workplaces where on-campus student opportunities are located. Thus, e-learning programming relies to a greater degree on students themselves arranging for and creating opportunities for professional socialization. Such requirement is often hidden, and those students lacking the necessary skills and contacts within the profession may find themselves at a distinct disadvantage compared to more "networked" peers.

A second strategy to support growth of professional consciousness is to incorporate communication technologies and collaborative learning activities as means for students to share the professional experiences from their work sites with other students. Kanuka and Anderson (1998) found that such sharing of experiences was the most valuable feature of computer conferencing for groups of professionals learning at a distance, and it is likely that this collaborative sharing is a significant enhancement to both preservice and professional education delivered at a distance. A second advantage of the e-learning context is the ease with which guest speakers (either live, prerecorded, or participating in asynchronous communication formats) can participate in e-learning programming. We have found that it is much easier and less expensive to attract professionals to participate in a class if they can do so without leaving their home or workplace. Finally, these technologies can be provided to both on-campus and e-learning programs to provide for online forums for discussion of professional issues. Weedman (1998) analyzed online discussions among campus students that consisted of over 4,000 individual messages. She concluded that electronic mail and computer conferencing did support students' "construction of their own professional socialization" and that students addressed the full range of professional socialization activities and topics. Is it likely that the increased access and technical proficiency of e-learning students provides even greater opportunities for the type of mediated socialization than Weedman observed in her campus-based subjects.

A final component of the hidden curriculum related to learning the profession is the capacity of distance education to continue this learning process throughout the career(s) of professional workers. Though the rhetoric of life-long learning argues for the need for continuous learning, it may mask a tyranny when employees are expected to donate significant amounts of personal time to acquiring job-related competencies (Tait, 1999). Often this continuing education takes time away from other obligations or potential opportunities for social contribution including family, church, community, or professional service. These temporal demands are not confined to distance education; however, the capacity to access formal or informal education opportunities anytime/anyplace, may place additional burdens and stress on over-committed distance education students, creating a debilitating hidden curriculum.

In sum, the "learning the profession" dimension of the hidden curriculum for e-learning seems to be neither advantaged nor disadvantaged as compared to campus-based education, though arguably, it is more pervasive due to its capacity to be "anywhere/anytime" when formatted for distance delivery.

Learning to be Expert

The official curriculum defines this dimension of the hidden curriculum as acquisition of the specialized skills and knowledge that define discipline-based expertise (Ahola, 2000). Bergenhenegouwen (1987) more cynically defines a hidden agenda as "university bluff" or learning to act like an expert, even without any real expertise. Arguably, identification of experts serves as a filtering function, allowing us to pay more heed to those whose knowledge and skill at applying and interpreting this knowledge is more valuable than those who lack such attributes. On the other hand, we also see examples in which such identification serves only the personal interests of "acknowledged" experts and can impair the emergence of new paradigms of knowledge and exclude minorities and other groups from positions of authority and power (Soldatenko, 2001). This dimension of the hidden curriculum is made more difficult to achieve (perhaps to the advantage of all) in e-learning in that expertise is exhibited in more manifest forms as teachers and students are forced to make their knowledge known through mediated contexts. In some cases (e-mail and computer conference-based delivery systems), this means that participants must defend their comments and arguments in text format—forcing more thoughtful, reflective and defended interaction (Feenberg, 1989). In other contexts (video and audio conferences), teachers report having to be more explicit and rely less on body language and other components of "teacher

immediacy", and pay more attention to activity planning to convey their enthusiasm and level of knowledge of the subject (Roberts, 1998). Thus, e-learning seems to provide a more level playing field for the emergence of expertise.

The "learning to be an expert" dimension of the hidden curriculum of e-learning requires that students and faculty learn new skills in order to display their "expertise." Whether the resulting mediated display of expertise is more authentic than that developed in campus-based education is open to debate. Some forms of e-learning that are text-based (computer conferencing and print-based correspondence) provide a form of inbuilt veracity testing since they are much more permanent and portable than voice-based interaction of the classroom. In nearly all cases, e-learning is more visible than that which takes place behind the closed doors of the classroom; thus, experts must be prepared and capable of defending their claims to expertise. Thus, one could conclude that the learning to be expert dimension of the hidden curriculum is made more authentic and visible in the networked as opposed to campus-based context.

Learning the Game

The final dimension and the one Ahola (2000) designated as the most important dimension of the hidden curriculum is "learning the game." Snyder's (1970) classic text describes the hidden curriculum as experienced by engineering students at MIT. He reported that a hidden curriculum reinterprets the formal curriculum, forcing students and faculty to determine what is really important and how instrumental (as opposed to learning or curiosity driven) they must be to survive. Snyder argued that this hidden curriculum "determines, to a significant degree, what becomes the basis for all participants' sense of self worth and self-esteem" (p. xii).

Is the game played differently in an e-learning context? Generally, the formal rules of the game are the same in both e-learning and campus-based formal education. Papers must be completed, tests written, and presentations delivered; however, the lack of opportunity for intense peer-to-peer consultation (especially in those forms of e-learning based on individual study) greatly restricts the most valuable source of knowledge of the game by both students and faculty. This is the dialogue that takes place among peers who are mutually engaged in developing coping strategies to ensure success in the formal education context. The higher levels of drop out associated with independent forms of distance learning (Coldeway, 1986) have been related to lack of integration (Sweet, 1986; Tinto, 1975, 1987) and a host of course and personal factors (Bernard & Amundsen, 1989), but they may be more directly related to failure of students to

understand and manipulate the hidden curriculum of distance education, so as to win the game. As in other dimensions of the hidden curriculum, the game in e-learning context is more novel to most students due to the lack of experience that is acquired in campus-based education during years of primary and secondary education experiences. Finally, in e-learning, learning many of the institutions established to act in advocacy roles on behalf of students and faculty (student's unions, faculty associations) are much less active and effective. Efforts at facilitating face-to-face contacts and informal mediated communications (i.e., coffee rooms in computer conferences) may help students help each other to both understand and successfully play in this dimension of the hidden curriculum.

RESEARCHING THE HIDDEN CURRICULUM IN E-LEARNING

Gordon (1995) argues that research on the "hidden curriculum" can only flourish when approached with an "emphasis on hermeneutic meaning." By this, he reminds researchers that the hidden curriculum does not exist except as defined by its interpretations in the minds of students and faculty engaged in the process. Thus, we may find traces of the hidden curriculum through analysis of artifacts such as computer conference transcripts of e-learning interactions (Rourke et al., 2001), through examination of photographs (Margolis, 2000), and through study of the behavior of distance students (Minnis, 1985). However, the most comprehensive and most valuable research approaches will focus on in-depth interviews combined with observations. This is more challenging in an e-learning context due to the lack of accessibility of student subjects to the researcher and the unique challenges associated with ethnographic research in virtual space (Hine, 2000). Nonetheless, I do not expect that the usual survey evaluation and feedback forms that seem to dominate e-learning research will provide the depth of understanding necessary to make manifest the hidden curriculum inherent in all forms of education—including e-learning.

HIDDEN CURRICULA BASED CRITICISM OF E-LEARNING

As I have attempted to point out in this chapter, e-learning, like all forms of formal education, has a hidden curriculum. However, it is unfair to single out this particular form of education as intrinsically more insidious and hidden than its campus-based counterpart. Much of the current criticism of e-learning stems from a romantic ideal of higher education in which small groups of brilliant undergraduates cluster around wise and caring professors who have no other responsibilities or cares than helping them

discover scholarly enlightenment. This vision hardly exists in the modern university—on-campus or at a distance!

The intrinsic technological basis of e-learning has been criticized as a means of asserting control and undo influence by the for-profit companies that produce communications and information processing technologies. At one level, this criticism is as valid as conceiving of campus-based learning as a conspiracy of construction companies, utility providers, or janitorial services that benefit economically from the construction and operation of campus-based education. At another level, it is true that large sums of capital investment are being attracted to for-profit, e-learning programs, and institutions. CEO of Cisco, John Chambers, comment that "e-learning will make email look like a rounding error", let loose a flood of eager investors wanting to be early in the "next big thing." The for-profit, online-based education providers that have survived the recent dot-com meltdown, are concentrating on the easy education marketplaces. They are developing programming in disciplines such as business, engineering, and computer science in which knowledge is rapidly changing and the industry is generating large enough profit to justify large investment in the "intellectual capital" of their employees. They are not focusing on the larger societal or personal learning needs that have traditionally been a defining component of higher education and are still highly valued in an "information age"(Shapiro & Hughes, 1966).

E-learning requires different types of capital and operational funding. In some cases, this funding has come from the private sector, which views the expansion of lifelong learning as a profitable enterprise. However, this privatization is not unique to e-learning as demonstrated by the rapid growth of suburban campuses owned by fast growing university corporations such as Phoenix University. In addition, many public, formally campus-based institutions such as Penn State and dedicated distance education universities, such as my own institution, Athabasca University, are investing heavily in the technology and program development necessary to expand and enhance their e-learning programming.

As noted earlier, there are many types and styles of e-learning—each with unique economic, social, and cultural characteristics. Some forms of e-learning have much greater and more insidious hidden agendas than others. Rumble (2001) points out that the cost of many forms of e-learning are greater than those of older forms of industrial and individualized distance education and can even by higher than campus-based education. In addition, Rumble notes a worrisome tendency for e-learning organizations to transfer costs directly from institutions to students—a crass and unwelcome hidden agenda from the students' perspective. However, high cost alone does not imply an absolute barrier. Each form of e-learning is generally capable of surmounting different barriers. In some forms of e-learning,

surmounting of geographic or temporal access is critical; for others, profession of educational opportunity at the lowest possible cost is critical. E-learning thus both creates and removes hidden and explicit barriers to participation in formal education programming.

HIDDEN CURRICULUM IN AN ERA OF EDUCATIONAL CHOICE

Most researchers dealing with the concept of hidden curriculum have assumed that the only educational context is the campus and the classroom. Thus, they have rarely framed their search for the hidden with any clear alternative to this traditional paradigm of education. The increasing variety and popularity of e-learning programming makes this assumption invalid and for the first time allows us to examine campus-based designs in comparison to viable alternatives.

The most obvious characteristic of the hidden curriculum of classroom-based instruction revealed in this post-hegemonic context is the physical constraints placed upon participants in campus-based education. Reducing these physical barriers and thus increasing physical access to educational opportunity has always been the major rationale for distance education programming. Educators now have to be explicit about the costs and benefits of compelling both students and staff to gather physically at a single location, at a precise time. Such meetings are expensive—(transportation and meeting room costs) and restrictive (allowing only those whose lifestyle and physical presence permits time and place-based participation). The benefits to such forms of education may be high, and the learning objectives may be tied to the need for the rich communication environment of synchronous, face-to-face interaction. However, currently much and perhaps the majority of such interaction is transmission-focused discourse (as in the traditional lecture). With such discourse, there is little evidence to suggest that presence in the same room at the same time makes any significant difference to learning outcomes.

There are educational objectives and social needs in a quality education experience in which face-to-face and campus-based instruction is both valuable and necessary to achieve the goals of both the official and hidden curricula. Thoughtful educators are now forced to define and construct rationale for grounding education in any restrictive environment—campus or distance-based. E-learning alternatives force institutions to confront the great untested (and hidden) assumption that campus-based education is always superior to that delivered in less physically restrictive contexts.

E-learning has also been criticized as a conspiratorial tool of those who promulgate a worldview based upon globalization of culture and economy.

It has also been argued that e-learning is a prime tool in the modernizing process of disembedding as in "the 'lifting out' of social relations from local contexts of interaction and their restructuring across indefinite spans of time-space" (Giddens, 1990, p.21). It can also be argued, however, that such disembedding creates a capacity to view our existence from outside of a particular worldview or culture. Hardly detrimental, this recontextualizing of knowledge is a defining characteristic of constructivist education. E-learning serves to recontextualize knowledge and forces students into unfamiliar circumstances. Like campus-based education, it has potential to be used either wittingly or unwittingly to promote a singular cultural or ideological bias. In addition, there is no guarantee that telecommunications-supported interchange will not further propagate stereotypes and an ungrounded sense of cultural superiority. In an extensive review of classroom-based telecommunications projects, Fabos and Young (1999) conclude that the research on effectiveness and the results of these innovative learning activities is contradictory, inconclusive, and vastly over optimistic. They note that "this discourse can be overly optimistic and can easily simplify cultures to the point of reinforcing the notion of Western dominance and the educational legacy of imperialism"(p. 232). Despite this potential for inept execution, I believe that good education, delivered in any format, develops critical capacity and the motivation to reveal hidden bias and social and cultural stereotypes. E-learning has potential to engage students and professors, through collaborative learning activity with individuals from different cultural, economic, and political systems—thus increasing knowledge of each other and the finite boundedness of our global home.

Educational programming developed in one culture and exported over large geographic areas inevitably carries within it numerous cultural and epistemological overlays or hidden curriculum ideology. Pincas (2001) notes that these overlays extend to culturally proscribed ways of learning, acting within learning communities, evaluating students, writing, expression, and attitudes towards technologies. It is not to say that these characteristics of a hidden curriculum are absent from campus-based education, but rather, the export and openness of the distance programming tends to magnify these cultural differences. However, the very tools that give rise to the awareness of potentially disruptive cultural barriers, can also be used in a reflective manner to abet growth and even transformation in cultural outlook (Ziegahn, 2001).

E-learning is in many ways a "disruptive technology" (Christensen, 1997). It provides a form of education that can be less expensive, more convenient, and initially not demanded by existing producers or customers (Archer, Garrison, & Anderson, 1999). Thus, e-learning is threatening and is an easy target for those who find a conspiracy hiding in any disruption or change from the "good old days." E-learning, however, is also a significant

contributor to the ongoing increase in percentage of adults engaged in postsecondary education. This growth is difficult to sustain in developed countries, and for many citizens of the world, there is no practical means to create the number of campus-based universities necessary to meet the large and growing demand of adult learners (Daniel, 1996). Thus, quality e-learning that is designed to allow for discourse and co-creation of knowledge by both students and teachers is a democratizing and benevolent response to both personal and societal need. Like other forms of education, its hidden curriculum can and should be made visible, so that students, teachers, and states can make informed decisions as to which forms of education most meet their needs.

It is also becoming apparent that there is a rapid convergence of the technologies of both distance and campus-based education—such that much of the hidden curriculum related to technology use in teaching and learning is shared in both contexts. Perhaps more useful findings will result from investigation of both the common and the unique hidden curricula of both forms of higher education—as opposed to a predisposed quest for proof that one form of higher education is more insidious than the other!

CONCLUSION

The pervasive restriction of physical and temporal access associated with campus-based learning, has been transformed to technological restrictions associated with e-learning. Each creates barriers and carries a significant hidden curriculum. Education systems and individual teachers who are best able to make clear their assumptions, goals, and processes and ensure that they are aligned with the most effective use of the tools of space, time, and distance will be able to make the best decisions and build the most responsive education systems. Those who are ideologically married to any single form (campus-based or e-learning) will only obfuscate the decision-making process that currently challenges both traditional campus-based education and e-learning systems.

NOTE

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CHAPTER 7

DISTANCE EDUCATION AND THE PROFESSORATE

The Issue of Productivity

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ABSTRACT

Faculty productivity is a complex variable that is difficult to measure. Most measures have focused on the amount of time faculty members spend per week in various functions such as teaching, research, and service. Middaugh (2001) reports that the average faculty member in the United States works 53 hours per week, but that only 11 of those hours are devoted to teaching. Current research in distance education provides a mixed picture of results, but the balance of the evidence indicates that distance teaching demands more faculty time than traditional classroom teaching. This creates a tension, especially in institutions where expectations for excellence in both teaching and research are high. Both entrepreneurial and traditional academic institutions are exploring alternative solutions such as "unbundling" of faculty functions in instruction and the increased use of technology. Unfortunately, many of these approaches remain uninformed by research. A developmental research

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agenda is recommended to provide a better basis for decision-making regarding the roles of faculty in distance education in the foreseeable future.

INTRODUCTION

It seems that whenever the issue of the productivity of higher education faculty is covered by the news media in the United States, it is in a negative light. For example, in 1994, the Cable News Network (CNN) produced a television program called "The Absent Professor." The show focused on professors who managed to hold down full-time faculty positions while simultaneously engaging in other demanding pursuits such as running restaurants, operating bed and breakfast inns, or managing lucrative consulting practices. The main message of CNN's "expose" was that faculty members in U.S. universities and colleges are completely unaccountable for their time.

The program highlighted Dr. Tzvee Zahavy, a professor of religion, who in 1993 held two full-time faculty positions simultaneously, one at the University of Minnesota and another at the University of North Carolina—Charlotte (UNC), two universities more than 1,100 miles apart. On Sunday nights, Professor Zahavy would fly from Minneapolis, Minnesota to Charlotte, North Carolina, teach a class there on Monday and Wednesday, hold office hours on Wednesday morning, and then fly back to Minneapolis on Wednesday night. Thursdays, he would teach at the University of Minnesota, and then, he would hold office hours there on Thursday and Friday. Officials at the University of Minnesota assumed he had refused the offer of a new position at the UNC-Charlotte, while the UNC-Charlotte officials thought he'd left the University of Minnesota. Apparently, none of the administrators at either university knew that the same professor was teaching an identical course at the other institution. When the situation finally came to light, Professor Zahavy, who earnestly maintained that he was giving both institutions full value for their money, was forced to resign from the UNC-Charlotte—and he was later dismissed from the University of Minnesota. (After a prolonged legal battle, he was eventually reinstated at Minnesota, and he is now a professor at Fairleigh Dickinson University.)

While Professor Zahavy's case seemed scandalous nearly a decade ago, in today's brave new world of distance education, many faculty are actually being encouraged to hold dual, if not multiple, academic appointments. Recently, I have been recruited several times to teach courses at other institutions at a distance, and while I have demurred, several of my colleagues are already teaching both here at The University of Georgia and for other institutions at a distance. Clearly, this is part of a national and international trend, although at least one Ivy League school, Harvard University, has

considered placing limits on faculty teaching for other institutions (Young, 2000, May). For many faculty members, it may soon be prestigious to list several university affiliations on their vitae, even though some may only be virtual ones.

Is this a desirable situation? Desirable or not, is it an inevitable one? This chapter examines these questions and others related to distance education and faculty productivity. Additional questions include the following: How do the demands of teaching using today's distance education technologies such as virtual classrooms and course management systems, compare to the demands of teaching traditional face-to-face classroom courses? How should faculty assignments be adjusted for teaching online, if at all? What research needs to be done to provide more insight into the real versus perceived demands of teaching online? These questions are primarily viewed from the perspective of higher education faculty in the United States, and therefore, the analysis and conclusions may not be applicable to higher education systems in other countries.

PUBLIC PERCEPTIONS OF FACULTY

In the United States, the public at large holds its public and private universities and colleges in high esteem (National Center for Postsecondary Improvement, 2001). Most parents want their sons and daughters to attend the best postsecondary institutions they can afford, and many people follow collegiate sports with almost religious fervor. Respect for institutions, however, does not necessarily extend to the faculty per se. According to some critics (Hanna & Associates, 2000), faculty are increasingly viewed as:

- White, male, and aging.
- Hired to teach, but primarily engaged in self-serving research and consulting.
- Notoriously unregulated.
- Completely unaccountable for their productivity.

Similarly, it is apparent that higher education administrators increasingly view many of their faculty colleagues as uncooperative and aloof from the pressures on higher education today (Lovett, 2002). Although they might be reluctant to state such views publicly, their actions to place limits on tenure and rein in faculty autonomy suggest that many university presidents, provosts, and deans see their faculty members as self-centered individuals who focus their energies on padding their vitae with questionable "scholarship." Among academic leaders, senior professors at research universities are subject to special criticism as being more interested in their own esoteric research agendas than in teaching undergraduates. This state

of affairs is exacerbated by the fact that administrators and many of the stakeholders who determine higher education funding formulas (e.g., state legislators and governors) most frequently cite teaching as the primary mission of higher education.

In addition, politicians, taxpayers, parents, and others who fund higher education have long questioned its cost-efficiency (Zemsky & Massy, 1990). In a national survey of over 1,000 adults, the National Center for Postsecondary Improvement (2001) reported that "Make them more efficient" was the number one response to the question, "What is the one thing you would do to improve colleges and universities?" The 1996 edition of *America's Best Colleges* published by U.S. News and World Report described higher education in the United States as a 200-billion-dollar-a-year "hideously inefficient" enterprise. Moreover, this report points out that Americans spend a larger share of family income on higher education than do the citizens of any other country in the world. Critics contend that the spiraling costs of higher education stem from declining teaching load, nonproductive research, and celebrity salaries (Middaugh, 2001).

Whatever the causes of higher education's financial problems, it is clear that the economic challenges are greater than ever and approaching the crisis state (Conklin, 2002). University of Minnesota President Mark G. Yudof (2002) claimed that in the United States "state support for higher education per $1,000 in personal income dropped from $11.22 to $7.94—a 20% decline—between 1979 and 2000" (p. 17). He lamented the "unvarnished truth ... that the extraordinary compact between state governments and their flagship university appears to be dead—or at least on life support" (p. 18).

Although recent research indicates that most faculty members actually value teaching over research (Leslie, 2002), academics, especially in research universities (or the numerous institutions that strive to emulate research universities) clearly perceive that rewards such as tenure, promotion, raises, and perks are skewed toward those who bring in research grants and publish in refereed research journals. Faculty also perceive that the nature of academic work has changed dramatically in recent decades (Benjamin, 2002). The *Goodbye, Mr. Chips* model is long gone (Middaugh, 2001). In that somewhat mythical model, faculty were burdened with heavy teaching loads and enjoyed little research time. They accepted low pay in exchange for greater autonomy and tenure that guaranteed lifetime employment, and their institutional loyalty was usually quite strong. Today, the faculty work model is more like that of the intrepid *Indiana Jones* featured in Hollywood blockbusters. In this model, faculty members continuously seek to reduce their teaching load in order to free up more time for research, scholarship, travel, and grants. The professorate has increased expectations for higher salaries and merit pay, and tenure is less valued.

Not surprisingly, in such a model, faculty members are likely to be much more loyal to their professions and disciplines than they are to specific institutions.

Regardless of whether they aspire to be Mr. Chips or Indiana Jones, academics today are feeling the pressure to be more productive. This pressure comes from both within and beyond the Ivory Tower (Conklin, 2002), but establishing what it means to be productive is no easy task.

DEFINING FACULTY PRODUCTIVITY

Faculty productivity is a complex variable to gauge and an even more difficult concept to communicate to the public at large. Middaugh (2001) states in the preface to his book titled *Understanding Faculty Productivity: Standards and Benchmarks for Colleges and Universities*: "Unfortunately, colleges and universities have done a horrible job of communicating to external publics, particularly parents and legislators, what faculty are expected to do, what they actually do, and how well they are doing it" (p. xv).

Most faculty productivity figures are reported in terms of time such as hours worked per week. A typical report might say that on average faculty members spend so many hours teaching, so many hours doing research, so many hours in service, and so on. Such calculations communicate little that really matters. Whether professors spend eight or 80 hours a week in the classroom or the research lab is relatively unimportant because simply being busy does not signify productivity (Middaugh, 2001). Judging productivity ultimately requires that some types of products be examined in terms of their quality. This is rarely done in academe.

What little is known about faculty productivity tends to support rather than dismiss the public and political concerns that are increasingly expressed about the productivity of college and university faculty (Mingle & Heydinger, 1994). For example, Middaugh (2001) reports that the average faculty member works 53 hours per week (ranging from 47 hours in community colleges to 57 in research universities), but that only 11 hours are devoted to teaching (ranging from 16 hours in community colleges to seven in research universities). Interestingly, research university faculty report spending twice as much time in "committee work" as they do in teaching, a fact that will surprise no one in academe but may greatly dismay those outside it.

The relatively small percentage of hours that faculty actually spend teaching in the classroom has led to calls for reform by many politicians. Several states have attempted to remove tenure, and other state legislatures have moved to mandate an increase in the time faculty spend teaching (Fairweather, 1999). According to a report from the American Federation

of Teachers (2000), post-tenure review has become required in most states, with special emphasis placed on both increasing the time spent teaching and enhancing its quality.

According to Fairweather (2002), there are several myths surrounding the issue of faculty productivity. One of the most prevalent is the widely held assumption that most faculty members can devote themselves to both quality research and quality teaching. Although there is little evidence that successful researchers transfer their research to their teaching or that there is any relationship between student ratings of teaching excellence and research productivity, Hattie and Marsh (1996) concluded that "the common belief that research and teaching are inextricably intertwined is an enduring myth" (p. 529). Fairweather's (2002) research, using a national sample of nearly 30,000 faculty in 962 institutions, found that only a small percentage of faculty are simultaneously productive as researchers and teachers, and yet, the majority of academic promotion and tenure policies demand that faculty demonstrate excellence in both research and teaching productivity as well as service (Middaugh, 2001). Curiously, Fairweather (2002) reported that "the most common factor in simultaneously achieving high teaching and research productivity is to spend more hours in the classroom" (p. 43). In contrast, most academic researchers, especially those with external funding, seek to "buy out" their instructional time to allow themselves more time for research.

Faculty Productivity and Distance Education

So what does all of the concern for increasing faculty productivity have to do with distance education? A critical analysis of the various rationales for distance and flexible learning ventures indicates that faculty productivity is an issue close to the core of these initiatives. Among the many rationales provided for distance education initiatives in higher education, four stand out:

1. Increasing access to higher education opportunities for those who cannot or prefer not to avail themselves of traditional campus bound programs.
2. Enhancing the quality of teaching and learning.
3. Making a profit.
4. Increasing faculty productivity.

Each of these rationales is examined individually below. First, with respect to increasing access, Sir John Daniel (1996), Past President of the Open University in the United Kingdom, maintains that the global

demand for higher education is so great that even establishing one new major traditional university per week cannot keep up. He argues for the establishment and expansion of "mega-universities" that will utilize information and learning technologies to accommodate hundreds of thousands of students around the world.

This argument has led some states and commercial interests to adopt a "build it and they will come" approach to establishing online universities. One of the best known of these institutions in the United States is Western Governors University (http://www.wgu.edu/), a virtual university established with great fanfare in 1997 by then Governor Romer of Colorado and Governor Leavitt of Utah. Despite expenditures of tens of millions of dollars and the attainment of accreditation from the Accrediting Commission of the Distance Education and Training Council, the institution has struggled to reach enrollment goals and realize any sort of return on investment (Boynton, 2000). The recent hardships suffered by other virtual universities such as Virtual Temple, UNext, and NYUOnline suggest that the "increasing access" rationale is not as simple and straightforward as it might seem and that we are still a long way from understanding the nature of the market for postsecondary distance education.

What about the goal of using distance education technologies to enhance postsecondary teaching and learning? Unfortunately, the history of technological innovations in higher education is poor (Cuban, 1986, 1999). Despite decades of research, educational researchers still can't clearly answer the question, "Does technology enhance learning?" In addition, recent noteworthy research reviews of technologies such as hypermedia and the Internet have yielded mixed, generally disappointing, results (Dillon & Gabbard, 1998; Fabos & Young, 1999). Every new technology brings forth dramatic predictions about how it will revolutionize education at all levels (Dunn, 2001; Perelman, 1992), but the reality is that most contemporary higher education courses are as dominated by lectures, textbooks, term papers, and tests as they have been for decades (Laurillard, 2002).

Absent strong research results, corporate vendors of hardware and software advertise the powers of their wares to enhance teaching and learning using simplistic bromides or false promises. For example, Macromedia, an otherwise exemplary corporation that markets Web development software such as DreamWeaver and Flash, has distributed brochures to faculty that proclaim, "To better reach your students, don't change your message. Change your medium." This kind of misleading advertising promotes the persistent myth that educational innovation is simply a matter of integrating the same old content and instructional methods into new technologies. A more informed perspective acknowledges that instructional design and pedagogical change are more important than switching media (Clark,

1994; Duffy & Cunningham, 1996). But keeping pedagogical change ahead of technological innovation is a daunting task.

If virtual universities are not reaching the distance education markets that have been predicted and claims that new technologies will directly improve teaching and learning are dubious, what about the rationale of containing costs and making profits? Despite the recent crash of dot-com enterprises ranging from home delivery services (e.g., webvan.com) to online pet stores (e.g., pets.com), many corporate leaders remain optimistic about the future profits that will be made from online higher education (Jones, 2000). For example, John Chambers, the CEO of Cisco, who predicted in 1999 that "the next big killer application for the Internet is going to be education" remains optimistic about the future of e-learning powered by Cisco products. In a January 2002 address to the World Economic Forum (WEF) in New York City, Chambers stated that "we are deeply committed to children's education through the use of Internet technologies, which I truly believe are the two great equalizers in life." Although some degree of philanthropy is probably involved, ultimately Cisco and many other Fortune 500 companies view online education and training as profit centers. A great deal of this interest is focused on higher education at a distance as reflected by the following information found on the Cisco website (http://www.cisco.com/) in May 2002:

- The global knowledge enterprise industry has reached over $2.2 trillion.
- The postsecondary market is $240 billion and represents nearly one-third of United States spending on education.
- The U.S. market for the online higher education industry is expected to grow from $1.2 billion in 1999 to $7 billion in 2003.
- Online courses constitute just $350 million of the $240 billion higher education industry but will grow to $2 billion by 2003.
- The global online college market is expected to reach 13.5 million by 2002, up from 3.4 million in 1995.
- In 1998, higher education institutions spent approximately $3.1 billion on all information technology—of this amount, approximately $305 million, or 9.8%, was spent on support for distance learning. (This includes spending on hardware, software, and communication products and services and excludes staff salaries.) This averages $128,953 spent for distance learning per institution.

Already, a few innovative higher education institutions are making huge profits. The clear winner thus far is the University of Phoenix, which as of May 2002, has 116,300 students enrolled in its "campus" courses and 27,600 in its online programs (http://www.uoponline.com/default.asp). The University of Phoenix's 2001 profits were up over 75% during a time

when virtually every other technology industry was losing money (Konrad, 2001; Symonds, 2001). One of the primary factors in this profit margin is the relatively low fees paid by Phoenix to teaching faculty. According to a corporate profile on Forbes.com:

> The University of Phoenix is a for-profit enterprise. It costs Phoenix online $237 to provide one credit hour of cybereducation, against $486 per hour for conventional education at Arizona State. The big difference: teacher salaries and benefits—$247 per credit hours for Arizona State against only $46 for Phoenix. Arizona State professors get an average of $67,000 a year. The typical University of Phoenix online faculty is part time and earns $2,000 a course teaching from a standardized curriculum.

While entrepreneurial institutions of postsecondary distance education, such as the University of Phoenix, Jones International University, and Capella University are realizing profits, corporate spin-offs from traditional universities such as Columbia University's Fathom and NYUOnline are failing to reach market predictions or going out of business altogether. Even some entrepreneurial institutions have foundered in the United States. For example, in early 2002, the UK's Open University closed its United States venture taking a loss of more than $13 million. In addition, there is scant evidence that traditional campuses are saving money by investing in distance education technologies (Carr, 2001).

This leaves the final rationale, that of increasing faculty productivity—the major focus of this paper—for consideration. Many faculty members view with suspicion and in some cases with outright alarm the growing pressure to engage in distance and flexible learning (Noble, 2002). It is clear to them that many institutions of higher education are seeking to increase faculty productivity through the adoption of distance education technologies. As highlighted by Cuban (1986), increasing faculty productivity via technology is an old idea: "In any list of explanations for the errant passion for technology by educators, a solid candidate would be the dream of increasing productivity, that is, students acquiring more information with the same or even less teacher effort" (p. 3).

The irony of the productivity agenda is that most of the existing research and evaluation evidence indicates that teaching online via the Internet actually requires more, not less, faculty time and effort. According to Palloff and Pratt (1999), "instructors in the online arena will find that the time needed to deliver this type of class is two to three times greater than to deliver a face-to-face class" (p. 49). Their analysis indicates that the primary increase in time derives from the two hours that online course instructors must devote on a daily basis to reading and responding to student posts to online discussion forums and answering email in contrast to

the two or three hours per week that faculty typically spend in face-to-face class meetings.

If teaching online actually does demand significantly more time than traditional teaching, then faculty who teach online will inevitably end up spending a larger percentage of their time actually teaching than their peers who do not teach online. However, this larger percentage is unlikely to satisfy legislators, administrators, and others who are concerned about faculty productivity. After all, although the amount of time faculty spend teaching may indeed increase, the productivity (at least as measured by FTE or enrollment figures) is unlikely to improve. In my own department at The University of Georgia, faculty members struggling to teach online courses with nearly 50 graduate students in them have proposed that in the future, online class sizes be limited to no more than 30 students.

Although not everyone agrees that online distance education must take more faculty time, the weight of existing opinions points in that direction. Ralph E. Gomory, President of the Alfred P. Sloan Foundation, in a January 2000 address that focused on the consequences of Internet learning for professors stated, "interaction [in an online course] with the students is also different. Usually there is more interaction, and incautious professors who do not set rules for when they will answer e-mail find they have given themselves 24 hour/day jobs." David F. Noble (1997), long a critic of technological intrusions into higher education, wrote that this approach to education "entails an inevitable extension of working time and an intensification of work as faculty struggle to stay on top of technology." In support of Noble's contention, Lee (2002) reports on a survey of administrators and faculty involved in a large scale distance education cooperative, which found that faculty did not perceive current rewards and incentives for distance teaching to be sufficient compensation for the heavier workloads such teaching required. Another survey conducted at a large research one urban university reported that "clearly, administrators and faculty did not agree on what motivates faculty participation in distance education" (Schifter, 2000).

Young (2000, January) reports that Ken W. White, co-author of *The Online Teaching Guide*, claims that a common mistake that faculty new to distance education make is not being aware of how much work it is. White states that online teaching is extremely labor-intensive because it's all reading and points out that once students get into in-depth discussions of controversial issues, they can create numerous messages that can literally overwhelm an instructor. He recommends that faculty keep their online interactions on an impersonal basis to conserve time and emotional energy. Ironically, if faculty members follow White's advice, then one of the more desirable claims for distance education—that it will actually increase

the quantity and quality of the interactions among students and faculty—will no longer be valid (Salmon, 2000).

In an interview in the *Chronicle of Higher Education* (Carnevale, 2000), James R. Mingle, senior policy adviser for the Southern Regional Education Board's Distance Learning Policy Laboratory, addressed the changing role of faculty members in light of distance education technologies:

> At this point, there really isn't a consensus on, for example, fundamental things like workload, expectations, and class size in an electronic environment. There was an initial view, especially among policymakers and legislators, that we could significantly increase class size in an electronic environment and therefore increase productivity. There are indications that the workload and the level of the interaction between faculty and student often go up in an electronic environment, and therefore, class size may not change.

Clearly, there is a need for rigorous research into the widely reported increased demands of online teaching. There are almost no studies that have actually compared the demands of distance and flexible learning on faculty with the demands on students. A rare exception is Collis, Winnips, and Moonen (2000) who compared two different web-based versions of the same graduate level education course. An intensive version of the course required students to collaborate in groups and make regular contributions to the course knowledge base. In the other version, students were given access to the same resources, but collaborating and contributing were optional. Based upon earlier face-to-face versions of the course, the researchers expected students to average around 80 hours of active engagement. Instead, they found that students in the intensive version averaged only 46 hours in the course, whereas students in the more casual version averaged a mere 31 hours. By contrast, the three instructors who led the course averaged 86 hours each. Interestingly, both groups of students performed equally well on the end-of-course performance examination. Is it possible that while faculty workloads are increased by distance education, student workloads are decreased? There is an urgent need for more research in this area. Earlier guides to online teaching (e.g., Cyrs, 1997; Harasim, Hiltz, Teles, & Turoff, 1995) as well as contemporary guidebooks (e.g., Lynch, 2002; Palloff & Pratt, 1999, 2001) provide some advice on handling the demands of online distance education, but the foundations for this guidance are largely anecdotal rather than research-based.

Bonk (2002) reports that over 80% of the respondents to a survey about online teaching indicated that teaching online was more time-consuming than teaching traditional courses. However, some authorities are unconcerned about the prospect of increased faculty workload resulting from distance education initiatives. For example, Freeman, Patel, Routon, Ryan, and Scott (2000) admit that teaching online can be an arduous, time-con-

suming task, but they proclaim that the rewards for both students and tutors in enhancing the learning experience through greater interaction make computer-conferencing a "killer application." The question arises: "Who is being killed?" The scant evidence that exists at this time suggests that it will be the faculty.

Hanna and Associates (2000) predict that traditional academics will have a difficult time adjusting to the era of digital competition inherent in postsecondary distance education because the modern university has become "organized anarchy." They predict that a status quo stance from faculty will be met with increasingly successful outside competition. As many academic functions such as admissions, student services, bookstores, and procurement are already being outsourced to dot-com vendors, it should not be surprising if some institutions of higher education soon look to outsource their basic teaching mission as well (Katz & Oblinger, 2000).

THE FUTURE OF FACULTY IN DISTANCE EDUCATION

When the U.S. Air Force Academy hosted a conference in 1997 called "Education in the Information Age," the keynote speaker was then Secretary of the Air Force, Dr. Sheila E. Widnall. Addressing an audience that included several hundred Air Force Academy cadets, most of whom were submitting to the rigors of a military education in the hope of becoming pilots, Dr. Widnall described the future of the 21st Century Air Force as having no pilots in planes. She described how the air fighter jets of the future will generate so many Gs of force when they twist and turn through the skies that a human pilot would lose consciousness; therefore, these planes will be flown from the ground via remote control. Indeed, the use of drone aircraft is already prevalent in the current conflict in Afghanistan. Needless to say, Dr. Widnall's message did not go over well with her young audience of would-be pilots.

Similar predictions are being made about the future of faculty in classrooms. James Duderstadt (1999), former President of the University of Michigan, acknowledged a possible future in which the:

> Emerging domestic market for educational services could be served by a radically restructured enterprise consisting of fifty thousand faculty "content providers," two hundred thousand faculty "learning facilitators," and one thousand faculty "celebrities," who would be the stars of the commodity learning-ware products. The learner would be linked to these faculty resources by an array of for-profit service companies handling the production and packaging of learning-ware, the distribution and delivery of these services to learners, and the assessment and certification of learning outcomes (p. 12).

The Star Model described by Duderstadt (1999) is being implemented by a company called Cognitive Arts started by the outspoken educational critic, Roger Shank (2001). Although Shank is no longer with Cognitive Arts, the company is producing higher education programs that will feature outstanding professors from institutions such as Harvard and Columbia Universities. According to the corporate website (http://www.corporate.cognitivearts.com/exec/corporate/home/index.cfm), these courses will be marketed primarily to those colleges and universities unable to hire "strong faculty."

New technologies being developed to deliver faculty stars to any student anywhere include holograms. Young (2000, February) describes how new video technologies already can transmit hologram-like images over high-speed Internet connections. Students who were interviewed on CNN concerning class sessions with their faculty hologram reported that they felt they were each being individually watched by the "ghostly" holographic professor.

Holograms have also captured the attention of cable video pioneer, Glenn R. Jones, founder of Jones International University, the first academic distance education institution created specifically for the Internet. According to the Jones International University website (http://jiu-web-a.jonesinternational.edu/eprise/main/JIU/home.html), it is the first fully online university to receive regional accreditation from the North Central Association of Colleges and Schools, the same accreditation agency for such prestigious universities as Northwestern University, Ohio State University, and the University of Colorado. In his book called *Cyberschools: An education renaissance*, Jones (2000) wrote: "Understandably, professors appearing as holograms is a discomforting idea. I can understand why these entrenched opinions exist, but I urge their proponents to rethink them" (p. 60).

A related approach to the Star Model is "unbundling" the functions of faculty involved in course delivery at a distance. In most traditional universities, individual faculty members have considerable individual autonomy for design, development, delivery (e.g., lectures), mediation (e.g., discussions), and assessment of their courses as well as related functions, such as student advisement (Paulson, 2002). But in distance education enterprises, such as "virtual universities" where the primary focus is on increasing productivity, only the design of courses may be relegated to those academics now considered "professors," while the majority of the functions will be taken over by a mix of adjunct teaching specialists, interactive technologies, and external providers. Paulson (2002) argues that:

> One way to guide institutional policy is to determine the combination of instructional agents that brings about the "highest value" in "learning pro-

> ductivity." ... Innovative, nontraditional institutions have found unbundling the faculty instructional role useful for rethinking the delivery of instruction. The concept of unbundling can assist traditional institutions, too (p. 132).

Dramatic increases in the number of part-time and adjunct faculty may be another indicator that traditional faculty appointments are in jeopardy. James R. Mingle, in an interview reported by Carnevale (2000) described the need for a new category of faculty member who would provide a tutorial function for distance and flexible learners in a manner similar to the model used by the British Open University. He acknowledged that who those people should be, how they should be compensated, and where their use is appropriate are all unclear.

Perhaps, there will be no need for human faculty at all in future distance education systems. While fledgling hologram technologies are already being developed, the future of higher education may migrate to virtual reality systems through which instead of learning about Abraham Lincoln's decisions during the Civil War from texts or lectures, students will play the roles of Lincoln's assistants and participate in the actual decision-making. Or perhaps web-based courses will be taught by interactive versions of popular celebrities, pop stars, or even cartoon characters. Already, Thomson Learning has bought the rights to the popular cartoon character, Dilbert, to "teach" its information technology courses in business settings. Thompson is also a major corporate player in Universitas 21, a high profile global virtual university collaboration that includes such prestigious universities as the University of Virginia, the University of Melbourne, the University of Hong Kong, McGill University, and the University of Edinburgh. Could it be that before long Dilbert will be teaching business courses at even these premiere universities? Doonesbury could handle political science, and perhaps Dennis the Menace and the Peanuts gang could collaborate in leading child and family development seminars.

If not cartoon characters, then perhaps it really will be those faculty stars from premiere institutions who are primarily responsible for distance instruction in the future. Paulson (2002) forecasts just such a possibility:

> An obvious first target for unbundling is the traditional lecture course ... Up to half of the credit hours produced at the lower-division level at American colleges and universities are concentrated in only twenty-five or so course titles. Rather than having each faculty member at an institution assume responsibility for a specific course, consider a modern alternative. Imagine a few dozen scholars with national reputations and expertise in these fields determining and delivering the requisite subject matter material in these courses. World-class faculty members (individually or in teams) could present this instructional material in a format both absorbing to watch and enticing to use (p. 135).

THE NEED FOR DEVELOPMENT RESEARCH IN DISTANCE EDUCATION

If only to avoid being replaced by star faculty videos, historical holograms, or cartoon characters, faculty must engage in the "scholarship of teaching" to influence the roles of technology and human teachers in distance education within the foreseeable future. We simply do not know enough about the demands of online teaching on faculty, nor do we understand the most effective alignments of educational objectives, content, subject matter expertise, instructional methods, technological affordances, and assessment strategies for distance education. The current state of knowledge in this area is woefully inadequate, and research findings to date are sometimes contradictory. DiBiase (2000) reports that distance teaching is less overall work than on-campus instruction while Visser (2000) concludes that distance education courses take more faculty time and effort. We don't even have a good handle on what distance education costs (Rumble, 2001) nor on how faculty members are being compensated for engaging in it (Berg, 2000). While traditional empirical and interpretivist research approaches may make a contribution, there is a greater need for development research that will integrate the desire to solve the practical problems inherent in these issues with the search for new knowledge (Reeves, 2000).

There are numerous problems that can be addressed through development research (Reeves, 2000; van den Akker, 1999). Van den Akker clarifies the meaning of development research:

> More than most other research approaches, development research aims at making both practical and scientific contributions. In the search for innovative "solutions" for educational problems, interaction with practitioners ... is essential. The ultimate aim is not to test whether theory, when applied to practice, is a good predictor of events. The interrelation between theory and practice is more complex and dynamic: Is it possible to create a practical and effective intervention for an existing problem or intended change in the real world? The innovative challenge is usually quite substantial, otherwise the research would not be initiated at all. Interaction with practitioners is needed to gradually clarify both the problem at stake and the characteristics of its potential solution. An iterative process of "successive approximation" or "evolutionary prototyping" of the "ideal" intervention is desirable. Direct application of theory is not sufficient to solve those complicated problems (p. 8–9).

At a time when public funding for higher education is shrinking (Conklin, 2002; Yudof, 2002), there is a need for development research examining the costs and benefits of staff differentiation in distance education. An important related issue is the reassignment of traditional faculty members

to substantive roles in distance education initiatives. Figure 7.1 summarizes the benefits and costs of online teaching for faculty identified by Collis and Oliver (1999). It is obvious that most of the costs seem to be to the disadvantage of the faculty whereas most of the benefits are to the advantage of students. How faculty can manage the increased demands on their time for teaching at a distance while at the same time maintaining research and service activities is a controversial issue. Some have suggested that the answer rests with staff differentiation, wherein some faculty are designated for teaching and others for research. Given Fairweather's (2002) finding that only a small percentage of faculty actually excel in teaching and research simultaneously, this is a significant policy change that deserves careful consideration guided by development research.

Potential Costs	*Potential Benefits*
• Extra time to prepare	• Better completion rates
• Extra time for technology	• Students have fewer difficulties
• Extra time for new methods	• Students' performance improves
• Discomfort with dependence	• Students experience new forms of learning
• Increased stress	• Instructor gains new skills
• Loss of esteem	• Some functions automated
• Opportunity costs	• More personal communications

Figure 7.1. Potential costs and benefits of online teaching for faculty.

What can be done to decrease the time demands of distance education technologies and lower the faculty stress that inevitably accompanies these demands? A national survey of faculty attitudes in the United States conducted by the Higher Education Research Institute (HERI) at the University of California at Los Angeles (UCLA) found that 67% of academics view "keeping up with information technology" as a source of stress in their work (Magner, 1999). Working closely with faculty members and other members of the academic community, including students, development researchers must craft prototype distance education solutions and refine these in practice while at the same time identifying generalizable design principles that will guide future initiatives (van den Akker, 1999).

Issues concerning intellectual property and distance education are also in much need of research (Katz & Oblinger, 2000). University administrators wish to expand patent policies to cover distance education programs created by professors, whereas faculty members wish to treat distance teaching materials as they would other publications such as textbooks, with the benefits going to them.

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Although it is unlikely that faculty will reap the full revenues from distance and flexible teaching and learning, faculty reward structures must be changed to accommodate these new demands. Palloff and Pratt (2001) note that the outcomes and products of online teaching can be shared, peer reviewed, funded, and presented at conferences. In the future, these activities may be given the same rewards as traditional research and publication.

The MERLOT project, wherein online learning resources developed by faculty are peer reviewed, is an important step in this direction (Young, 2000, July).

Perhaps, no area needs more research than the blending of alternative pedagogies with appropriate technologies. Evaluations conducted by Steve Ehrmann (1995) and his collaborators in the Flashlight Project provide excellent starting points. They have identified instructional strategies that support effective online education as follows:

- Project-based learning in an information-rich, tool-rich environment.
- Collaborative learning when communication can be synchronous and asynchronous.
- Learning at paces and times of students' choosing.
- Learning marked by continuous improvement of a piece of work.
- Improved student-faculty and student-student interaction and enhanced feedback.

In addition to investigating the most effective combinations of instructional strategies and alternative technologies, other important research questions include:

- What are the real time demands of distance education for learners?
- How could a "learner's bill of rights" in distance education be established?
- How can the quality of faculty productivity be measured in distance education?
- How can faculty load and compensation be determined if faculty contribute to multiple universities and colleges simultaneously?
- How should assessment be handled in distance education?
- How do the outcomes of distance education differ from those of residential programs?

Answering these and other questions is not solely the responsibility of educational researchers. Lee Shulman, President of the Carnegie Foundation for the Advancement of Teaching, advocates a "scholarship of teaching" for all faculty members regardless of their disciplines. Shulman (2001) directed special attention to the need to focus the "scholarship of teaching" on new learning technologies:

Technology is the 300-pound gorilla that no one can ignore, and this new element in all of our lives has had a healthily disruptive impact on our old habits. For example, many faculty members are now asking serious questions about teaching and learning: How do we know these new technologies are effective in fostering student learning? What does student learning look like, and how do we know it when we see it? What's the difference between the kind of learning that occurs in traditional venues and the kind that occurs in technologically mediated settings? Most universities have already committed significant resources to the uses of technology. And, since technology is not something you simply plug in, such research questions spawn a much larger set of inquiries about the curriculum, the design of instruction, and assessment, thereby encouraging a more general spirit of inquiry about teaching and learning.

CONCLUSION

The literature, analysis, and critique presented in this chapter provide strong evidence that faculty productivity in distance education is a controversial issue in dire need of rigorous research. Furthermore, it has been argued that the nature of that research should be a developmental one.

The move toward development research in postsecondary distance education will not be easy because it requires fundamental change in the basic epistemology held by most faculty members as well as refinement of their mental models of scientific research processes. Most academic researchers retain the simplistic notion that experimental or quasi-experimental methods should be used to compare distance education courses with on-campus courses despite hundreds of studies indicating "no significant differences" in learning if only the medium of instruction is changed (Clark, 2001). In addition, academic research models are still dominated by positivist epistemology that regards theory above and apart from practice. The overall goal of research within the positivist tradition is to develop long-lasting theories and empirical principles that can be handed off to practitioners for implementation. While this experimental approach may work in fields such as chemistry and biology, it has not been very successful in the social sciences, including education (Kaestle, 1993; Miller, 1999).

In contrast to traditional empirical research models, development research requires a pragmatic epistemology that regards theory as being collaboratively shaped by researchers and practitioners. The overall goal of development research is to solve real problems while at the same time constructing design principles that can inform future decisions. This won't be an easy transition on most campuses, but it is one that faculty will ignore at their peril. Nothing less than what it means to be a productive academic in the 21st Century is at stake.

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CHAPTER 8

EVALUATION AND RESEARCH IN DISTANCE EDUCATION

Implications for Research

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ABSTRACT

In this chapter, we start our discussion on the importance of defining the construct of distance education before proceeding with theory development and research in distance education. We then make a case for the importance of theory-building in distance education and discuss research methods that merit special attention by distance education scholars, and pose questions that need to be addressed using these methodologies. Finally, we identify six areas that need to be included in distance education research programs: adaptations for learners, instructors, and instructional designers, evaluation (student, course, program), globalization and cultural diversity, access and equity, policy issues, and the impact of technology on the fabric of education.

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DEFINING DISTANCE EDUCATION

Distance education has enjoyed tremendous growth in the last ten years due to advances in technologies for the delivery of instruction. Students, however, have been taking courses via distance education since the later half of the 19th century. The first delivery method was correspondence courses that were then followed by a variety of electronic delivery systems. We will start with a brief explanation of these major categories of distance education, then examine the difference between communication modes, and finally define distance education.

Examining Distance Education Delivery Modes

There are five general categories of distance education delivery modes: correspondence, radio, television, two-way audio/video, and web-based. The following paragraphs describe each of these delivery modes.

Correspondence Courses

One of the earliest references to a correspondence course was in 1833 that relied on the postal system for communication (Simonson, Smaldino, Albright, & Zvacek, 2000). Today, a correspondence might consist of a textbook and study guide. The study guide includes one or more exercises for each unit of instruction with the purpose of facilitating the student's comprehension of the text or reading materials. Traditionally, communications between the student and instructor have been sent via the postal service, but the mode is changing with easy access to fax machines, email, and the Internet.

Research is still being conducted on correspondence courses. For example, St. Pierrie and Olsen (1991) investigated student satisfaction while taking a correspondence course with an emphasis on the impact of feedback on student satisfaction. Thompson and Knox (1987) investigated the relationship between the cognitive style of field-independence to determine if there was a relationship between persistence and student evaluations of the course.

Radio Courses

Broadcast radio provides a means of delivering distance education courses to students living in remote areas and is often used in developing countries as a means of providing an inexpensive alternative to classroom instruction. Some radio courses are a hybrid consisting of features of a correspondence course and broadcast radio. This approach of combining audio with planned interactions and text is very similar to the audio-tuto-

rial approach developed by Postlethwait and Novak (1972) for use in college botany classes.

Research studies on radio courses include evaluations of the system (Drummond, 1993) and surveys of the uses of the system (Rosen, 1984). Schramm (1977) identifies several studies completed on radio courses that vary from cost benefits to media comparisons with traditional classrooms on achievement performance.

Broadcast Television Courses

The British Open University popularized the use of broadcast television for delivering college level courses to large groups of students in the early 1970s. In the United States, the University of Mid-America developed a similar model for development and distribution of college level courses. Presently, PBS offers a variety of broadcast and non-broadcast television courses for college credit. A typical course consists of a series of weekly television programs (30 minutes in length), a textbook, and a study guide.

Example research on television-based courses often focuses on surveys of learning satisfaction (Brown, 1975a, 1975b). Publiese (1994) and Hezel and Dirr (1991) investigated the factors that contribute to student persistence and motivation in televised courses.

Two-Way Audio/Video Courses

Compressed video or two-way audio/video represents a unique form of distance education that requires all students to meet at the same time but in different locations. Keegan (1996) labels this type of delivery as a virtual classroom, which he sees as distinctly different from distance education. Simonson et al. (2000) view two-way audio/video instruction as a new form of distance education in the United States. An early example of the research concerning a two-way audio/video course was a course evaluation conducted by Morrison, Bland, and Ross (1992). A second study investigated the physical design of the local and remote classrooms (Gopalakrishnan Jayasinghe, Morrison, & Ross, 1997).

Web-Based Instruction

This category represents the newest delivery method for distance instruction, which can take different forms. For example, a traditional classroom course might use web-based instruction to supplement the live lectures and discussion. Another class might only meet once a month on campus and use web-based instruction for a majority of the instruction. A course could also be totally web-based with learners located any place in the world.

Examples of research with web-based instruction include comparisons with other delivery systems. For example, Collins (2000) compared student

achievement and course satisfaction in the same course offered as a web-based and as a correspondence course. Other recent studies have investigated the amount of time faculty members devote to developing the instruction (Visser, 2000) and group development in a computer conferencing environment (MacDonald & Gibson, 1998).

This discussion has described five broad types of distance education delivery models and example research that has been conducted on each model. The studies range from evaluations of courses to qualitative analysis of interactions to experimental studies of the learning environment design.

Communication in Distance Education

Communication in distance education courses occurs in two modes. The first mode is asynchronous communications typical of correspondence, radio, and television courses. Communications between student and instructor occur in different time frames. The use of the postal system for communication in a traditional correspondence course best represents the delay between the time that a message is sent and when it is received and read. Asynchronous communications do not occur in real time; that is, there are delays between the time a message is sent and received. Asynchronous communications are characteristic of correspondence, radio, and broadcast television courses but are also used in other delivery formats. They are also characteristic of web-based instruction that uses mailing lists, email, and forums for discussion and communication.

The second mode is synchronous communications that occur in real time. An example of a synchronous communication is one that you have face-to-face with a colleague. Examples of synchronous communication in distance education include two-way audio/video and web conferencing—both text-based and video-based. The receiver of the message can respond to it immediately just as in face-to-face communication.

DEFINITIONS OF DISTANCE EDUCATION

The definition of distance education continues to evolve and is a source of disagreement among various scholars. Moore (1973) defined distance education as separating the teaching and learning behaviors. That is, the student and teacher were separated by *both* time and distance so that print, telephone, or other electrical or mechanical devices facilitated communication. The distinction that the student and instructor are separated in both time and place was also made by Holmberg (1977) and Garrison and Shale (1987). An important component of the more recent definitions is

that two-way communication between the learner and instructor is mediated by technology using either synchronous or asynchronous modes.

In 1989, the definitions showed a shift by not requiring the student and instructor to be separated in *both* time and location. For example, Barker, Frisbe, and Patrick (1989) suggested that distance education courses could allow for students and instructor to interact synchronously through audio and video links. Moore (1990) modified his earlier definition to accommodate advances in technological communication by stating that the student and instructor are separated in location *or* time. These newer definitions move away from the concept of the self-study characteristics of the correspondence, radio, broadcast television, and even web-based courses, and begin to resemble more traditional instruction in methods and delivery. Rumble (1989) recognized this trend and stated that the more face-to-face instruction is included in the course, the less it resembles a distance education course. He proposed a continuum from a pure distant program (i.e., asynchronous communication) to a contiguous system (i.e., synchronous communication).

The increased emphasis on synchronous communication has raised the question of whether these newer definitions and courses are distance education programs. For example, Rumble's (1989) continuum of distance to face-to-face instruction suggests that there is a point when the instruction is no longer considered distance education. Keegan (1996) also questions whether a model that is based primarily on synchronous communication is distance education. Keegan labels the synchronous delivery methods as a virtual system based on an electronic version of face-to-face instruction, and addresses the concern raised by Rumble (1989) in his definition. Keegan states that there is a quasi-permanent separation of the teacher and student in distance education instruction. However, there is also occasional synchronous communication so that students can benefit from or initiate a dialog.

An understanding of the various definitions is needed to understand the distance education research and to develop a research agenda. The breadth of one's definition of distance education will determine the focus of the research studies.

THEORY AND DISTANCE EDUCATION RESEARCH

A primary criticism of distance education research is that it is not based on theory. In a relatively recent analysis of distance education research that we conducted, one of the primary problems identified was that it was very difficult to summarize and integrate the results of research studies, given that studies were not based on a particular theory or perspective (Anglin &

Morrison, 2000). What do we mean by theory? Do we need theories in distance education?

One definition of theory stated in the *American Heritage Dictionary of the English Language* (1992) is that theory is "systematically organized knowledge applicable in a relatively wide variety of circumstances, especially a system of assumptions, accepted principles, and rules of procedure devised to analyze, predict, or otherwise explain the nature or behavior of a specified set of phenomena." A theory allows the investigator to make predictions based on a particular theory and then test if the statements hold true. A good theory will have predictive power across a number of contexts. The knowledge gained by developing and testing sound theories can allow individuals to generalize theory predictions across various contexts and environments. We will assume the *American Heritage Dictionary* definition of *theory* for our discussion in distance education. A more complete discussion of theory building can be found in Dubin (1969).

With the rapid development of distributed learning systems (particularly for delivery on the Web) and the pressure to quickly design, develop, and deliver distance education courses, there is a serious challenge facing researchers in distance education. We believe that there is a serious gap between distance education practice and distance education theory. This gap is reflected in the distance education research literature. Many studies in distance education research are not based on theory, and hence, it is difficult to develop a body of knowledge that can help us develop a conceptual structure for both researchers and individuals who are attempting to develop models of distance education for use when designing instructional programs (Anglin & Morrison, 2000). Moore and Kearsley (1996) have argued that there is a significant need for theory-based research in distance education. Moore points out that such theory-based studies will give us the predictive power to control distance education variables. We concur with Garrison's (2000) statement that "theoretical frameworks and models are essential to the long-term credibility and viability of a field of practice" (p. 1). However, we do acknowledge that, in many cases, distance education practice is proceeding without being grounded in established distance educational theories or models based on theories.

SELECTED REVIEWS OF THE LITERATURE

There have been numerous articles written about distance education including theoretical papers, literature reviews, primary research studies, and discussion papers concerning distance education in a particular context or setting. We will discuss issues identified in two recent literature reviews in order to provide a context for our discussion of future distance

education research and evaluation. Space limitations prevent us from comprehensively discussing many theoretical papers and reviews including the informative work of Bååth (1982), Holmberg (1989), Keegan (1996), Moore (1991), Moore and Kearsley (1996), Peters (1994), and Wedemeyer (1971). Garrison (2000) provides a more in depth discussion of their contributions.

As Berge and Mrozowski (2001) have pointed out, distance education research has received significant criticism across time. We will now briefly summarize some of the issues, concerns, and future prospects discussed in the literature.

Anglin and Morrison (2000) analyzed distance education research published in two journals, *The American Journal of Distance Education*, 1987–1999 and *Distance Education*, 1991–1999. The two journals are published in the United States and Australia, respectively. The analysis had two primary goals. First, the types of research published in the two journals (i.e., primary research, conceptual-theoretical articles, literature reviews, evaluation studies, and other) were identified. Second, the implications of the analysis of past research for future research programs were discussed. Across the two journals, Anglin and Morrison classified 146 of the studies as primary research studies, 115 conceptual and theoretical papers, 14 reviews of the literature, 14 evaluation studies, and 52 "lessons learned" or "how-to" articles. A significant number of the primary research study results were based on participant reaction surveys. Student learning was assessed in few studies across the two journals included in the analysis. Anglin and Morrison concluded that much of the research is not theory based, and hence, it is difficult to summarize across articles. In addition, it was found that many of the studies were based on participant reaction surveys, there were a significant number of media comparison studies, many of the studies did not view distance education as a system including many variables, and that additional theory-building is needed.

Berge and Mrozowski (2001) reviewed the research literature in distance education from 1990 to 1999 as reflected in four journals: *The American Journal of Distance Education, Distance Education, Journal of Distance Education,* and *Open Learning.* In addition, Dissertation Abstracts were also searched for the dates 1990 to 1999. Berge and Mrozowski classified research articles based on Sherry's (1996) "areas" of distance education research. Sherry's classification system includes the following ten categories: "redefining roles of key participants, technology selection and adoption, design issues, strategies to increase interactivity and active learning, learner characteristics, learner support, operational issues, policy and management issues, equity and accessibility, and cost/benefit trade-offs" (p. 337). Based on their analysis of the studies included in the four research journals included in the review, Berge and Mrozowski (2001) found that

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for the 245 research articles analyzed across the four journals, three-fourths of the articles (186) used a descriptive methodology. Other methods used (less than 10% for each category) were case studies, correlational research, and experimental research.

Classification of the research articles across the four journals using Sherry's (1996) classification system provided a "picture" of the areas that are receiving more or less attention by researchers. Categories given the most attention by researchers (over 100 articles in each category) were "design issues," "strategies to increase interactivity," and "learner characteristics." Content areas receiving the least attention by researchers included "learner support," "equity and accessibility," and "cost/benefit trade-offs." Berge and Mrozowski (2001) identified four "gaps" in the research literature including: lack of a significant amount of research evaluating the outcomes for instructional programs vs. individual courses, distance learning dropout rates, focus on effect of single versus multiple technologies, and lack of assessment of the effect of digital libraries in distance education.

In conclusion, distance education research is the object of considerable criticism. Some of the primary issues are a lack of theory to guide the research, a preponderance of studies using participant reaction surveys, a lack of studies including measures of student learning, and a number of important areas for which little research has been done.

Before presenting our view on evaluation and research in distance education and the implications for research, we would like to discuss one additional issue. When discussing theoretical, research, and evaluation issues, we think it is crucial to distinguish between delivery technologies and instructional technologies. Otherwise, we believe researchers and others will not be able to communicate well between each other concerning results of their research. Clark (2000) makes a distinction between delivery technologies and instructional technologies. Clark suggests that "delivery technology is characterized by the equipment, machines and media that provide access for instruction ... Instructional technology seeks to influence the learning of students. Examples of instructional technology are ways to sequence and structure lessons, use of examples, provisions for practice, and tests" (p. 4). We believe it is critical to make Clark's distinction between delivery technologies and instructional technologies when analyzing existing distance learning studies and proposing future studies.

TYPES OF RESEARCH: BASIC, APPLIED, AND EVALUATION RESEARCH

There are many different ways of categorizing research in education, instructional technology, and distance education. We feel that the distinc-

tion between basic, applied, and evaluation research is necessary, and we see these three approaches as a natural progression in the development of the distance education knowledge base. The following is a brief description of each approach.

Basic research is characterized by high internal validity of the stimulus materials. The stimulus materials may be artificial in nature (e.g., nonsense words or a story about a fictitious island and its geography) so as to avoid any confounding of the results by interaction between the content of the stimulus materials and the learner's prior knowledge.

Applied research entails further testing the results from the basic studies in a manner to increase generalizability. Basic studies often reduce internal validity to achieve higher external validity. That is, the applied studies often use realistic stimulus materials to provide a basis for generalizing the results to real-world applications.

Evaluation studies are the final step in the progression. We can characterize these studies as evaluations of a product in a realistic application. Evaluation studies use a variety of methodologies including observations and survey instruments to determine the effectiveness of a course or product. While these studies may have limited generalizability, they are often beneficial to practitioners who are designing similar products and serve as a source of ideas for future applied and basic research studies.

The literature base for distance education should include examples of basic, applied, and evaluation research. Although, we would agree that there would be fewer basic studies due to the applied nature of distance education. What we find disconcerting is the large number of evaluation studies (both anecdotal and evaluation reports) in the journals (Anglin & Morrison, 2000). The remainder of this chapter will focus on the development of a more balanced research agenda that creates a knowledge base that researchers and practitioners can use.

SUGGESTIONS FOR FUTURE DISTANCE EDUCATION RESEARCH AND EVALUATION

In our discussion in this section, we will first provide an example of a progression of research from basic, to applied, to evaluation research to establish a theoretical foundation in a specific program of research. We will then examine research methodologies and approaches and relate them to selected research areas and questions applicable to distance education research. Lastly, we will identify additional topics and areas that we believe merit attention by researchers in distance education including, adaptations required of learners, instructors, and instructional designers, evaluation, globalization and cultural diversity, access and equity, policy issues, and the

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impact of delivery and instructional technologies on the scope and nature of instruction.

Basic, Applied, and Evaluation Research: An Example

Research in distance education needs to establish a firm theoretical foundation that supports and encourages new research that leads to the development and support of distance education theories. In the following section, we will provide an example of the use of basic and applied research in distance education.

Several studies have examined classroom communication and have investigated the effect of facial components, vocal components, and space. For example, Argyle and Dean (1965) created a simulated environment for discussion between a participant and experimental confederates by fixing chairs to the floor at various distances. They were able to observe eye contact and body movement such as leaning during a contrived conversation. As a result, they concluded that eye contact is an essential component of interpersonal communication. We would classify the Argyle and Dean study as a *basic* research study due to the contrived and controlled environment. Gopalakrishnan Jayasinghe et al. (1997) conducted an *applied* study based on the results of the Argyle and Dean study. The Gopalakrishnan Jayasinghe et al. study manipulated camera angle and placement of monitors to simulate a two-way video and audio classroom. They used realistic materials (classroom management) for a group of teacher education students. The study concluded that eye-level cameras with groups of four to five students grouped around a small monitor were most conducive to communication. These two studies have developed a strong theoretical foundation for interpersonal communication. The next logical step in this research is to create actual classrooms following the design recommendations of Gopalakrishnan Jayasinghe et al. and verify the results in a real-world application. By conducting a series of studies that are based on the results of basic research, we can develop potential applications through applied research and then verify the results in an evaluation study. Such research provides a basis and support for the development of distance education theories. In our suggestions for future research, we leave it up to individual researchers to determine whether basic, applied, or evaluation research is warranted based on their own personal interests, specific research questions, and the environment in which they work. We would encourage investigators to consider the framework (basic, applied, evaluation research) we have provided so that we will develop a cohesive body of knowledge.

Methods

Shulman (1997) suggests that "the best research programs will reflect intelligent deployment of a diversity of research methods applied to their appropriate research questions" (p. 25). We believe that for distance education research, there is a significant need for studies using methods matched to research questions using an array of research methods. Since the various ways of knowing as defined by research methodology are not isomorphic, the use of multiple methodologies will help us to develop a more complete knowledge base for distance education if we use an array of research methodologies for the research questions that we address. The primary methods used, historically, in distance education research are descriptive in nature, and a significant number of the descriptive studies report the results of participant reaction surveys (Anglin & Morrison, 2000; Berge & Mrozowski, 2001). We will now discuss issues concerning methodology that are important to consider when discussing a research agenda for distance education.

Theory Development

As discussed previously, we believe there is a need for the development of distance education theories. Garrison (2000) has suggested "for distance education this means that theoretical developments must reflect changes taking place in the field of practice" (p. 14). Given that our current theories of distance education are "behind" the practice of distance education, we should concentrate on developing local theories focusing on specific instructional technology and pedagogical issues, delivery technology, and specific educational purposes. Garrison (2000) has suggested that general education theories incorporating predictive models might not be possible in the immediate future. We believe that there are many areas in which at least at a micro level, theory-based instructional design research related to distance education is needed (e.g., metacognition and distributed learning systems, strategies for building learning communities, collaboration strategies, group-work, motivation, interaction, efficiency of learning, and the validation of existing strategies for online learning).

We assume that eventually, any good research agenda is grounded in theory. One line of inquiry that must be continued is the development of theories of distance education, whether they are global or local.

Comparative Experimental Quasi-experimental Research

There is certainly a need over the long term to develop predictive models that will help us determine how to design, develop, and deliver quality distributed learning programs. As discussed earlier, experimental research will help us to develop predictive models that will hopefully generalize across a

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number of contexts (Ross & Morrison, 1996). Otherwise, we will continue to reinvent the wheel every time we develop a distance learning program. In some instructional situations, it is not possible to use randomized assignment or to include a control group even though manipulation of an independent variable is desired. In this case, quasi-experimental designs would be useful for distance education researchers (Cook & Campbell, 1979). This would allow the researcher to control for as many threats to validity as possible. For the short term, we may have to settle for theory conformation of more local theories rather than broad, all-encompassing theories.

Qualitative Research

While it would be ideal if we were able to develop global theories of distance learning and then attempt to confirm them using experimental method, currently, this may not be a realistic goal. Qualitative research methods will help us to gain a more complete picture of distance education systems. There are many qualitative research methods, and our goal here is not to be exhaustive in describing them (Denzin & Lincoln, 1994). We only attempt to suggest areas that we think need further attention. Qualitative research methods allow us to take a deeper look into a process or activity. For example, in depth student interviews can provide a wealth of information, which can be used by instructional designers, distance teachers or facilitators, and theory builders. Methods of conversation analysis and discourse analysis can also help us to gain insight into the distance learning process. For example, the text in student emails, threaded discussions, online chats, and collaborative group work can be examined and analyzed.

Media Replication Approach

We would also like to mention an alternative research methodology to the traditional media comparison study. Ross and Morrison (1989) proposed the media replication approach that encourages the development of specific instructional strategies for different media and then the comparison of these similar strategies. Such an approach leads to the development of instructional strategies or methods that are effective in a particular medium. For example, rather than compare traditional classroom instruction to two-way audio and video, a researcher might compare two approaches to conducting classroom discussion in the two delivery systems. The focus, however, is on the design of the instructional strategies for conducting the discussion rather than on the delivery media.

Survey Research

Survey research is an appropriate research method for addressing certain types of distance education research questions. We hasten to remind the reader, however, that many of the distance education research studies are

participant reaction surveys. Participant reaction surveys are appropriate to use when assessing student attitudes and motivation or to discover unanticipated benefits of a particular program (Clark, 2000). The results of this type of survey are usually not generalizable to other settings. Researchers using this methodology must take steps to assure a reasonable return rate, or serious threats to the reliability and validity of the results will occur.

Literature Reviews and Literature Synthesis

Many journals report the results of studies on distance learning. We need to continue synthesizing and integrating the research results reported by individual researchers in their published studies (Glass, 2000; Glass, McGaw, & Smith, 1981). Results of such reviews and synthesis studies will help us to support or deny our theories, be they global or local. Literature integration and synthesis also provide a check on whether the knowledge base we are developing is cohesive. For example, in their recent review of the research in distance education, Berge and Mrozowski (2001) summarized the research literature in four research journals, but they also identified four gaps. Berge and Mrozowski have made a significant contribution to our knowledge base on distance education by identifying gaps in the existing research literature.

Model Building, Testing, and Best Practices

Given that distance education practice is occurring without the support of unified distance education theories, development and evaluation of models of distance education for specific outcomes and contexts will make a significant contribution to our knowledge base. The knowledge gained from the implementation of distance learning programs in particular settings could make it possible in the long-term to develop global theories of distance education. Calder (2000) defines best practice as "that combination of structure, educational technology and content of a learning opportunity, which, in certain contexts and for particular groups of learners, is most likely to achieve the purposes of the main stakeholders" (p. 1). Calder identifies three issues concerning the development of best practice that need to be addressed: "effects on curricula," "sensitivity to the effects of cultural diversity in determining good practice," and "the challenge of access and equity" (p. 9–10). The knowledge gained by reflective practice can help us to further refine our ideas concerning theory development in distance education. Theory can inform practice, and practice can also inform theory.

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Additional Distance Education Research Areas

Adaptations for Learners, Instructors, and Instructional Designers

Another distance education research area we believe worthy of attention concerns the adaptations that three constituent groups of people—learners, instructors, and instructional designers—will have to make if distributed learning systems are to be successful. Many individuals in each of the three groups have learned, taught, or designed instruction in a variety of traditional ways. Historically, the general approach has been the traditional classroom where didactic instruction was the primary method used. Use of this approach with most distributed learning systems is a sure way to fail. There is a wealth of research questions that need to be addressed.

We have identified three major categories of research in distance education related to learners, instructors, instructional designers, and the changing role of these individuals. The following paragraphs will describe these research areas.

Success Factors for Learners

There are many issues that need to be investigated concerning success for learners including communication patterns between students and their instructors and students with students; student adaptability and persistence, and students' organizational, time management, and problem-solving skills. Additionally, given that in many cases, all learners will become involved in distance education as students, how can we increase the probability that students who do not fit the profile of successful online learners will be successful? Similarly, we need to study student dropout rate issues in distance learning programs. Berge and Mrozowski (2001) have identified a significant gap in the research literature concerning the area of dropout rates for distance learners. What is the effect of placing distance learning students in cohort groups in which they take all classes in a distance-learning program "together"? Are there effective strategies we can use to teach students who are successful "traditional" learners that will be effective with online learners? What type of support is needed to encourage learners to complete a course of study?

Success Factors for Instructors

Similar research questions could be posed for online instructors and facilitators. For example, in higher education, many faculty members are now expected to teach courses online. We expect this trend to expand considerably in the future. Consider the following example. We have identified two potential research areas concerning instructor success. The first area is the organization of the course. A traditional approach to teaching a college course would be to use the lecture method. At the beginning of the

course, students are given a syllabus and possibly a course schedule and reading assignments. In addition to lectures, there might be a discussion session, and then, they are tested and/or required to write papers and do projects. There usually is student-to-student, instructor-to-student, and student-to-instructor interaction prior to, during, and after the class session. Will this approach work with web-based instruction? We actually question if the approach works very well with traditional instruction. What type of model or approach is needed for web-based instruction? That is, should it model traditional classroom instruction, or does it require a unique approach? Does a traditional syllabus include all the necessary information for students taking a course online? What are the characteristics of successful online instructors? How do effective online instructors handle issues of control and collaboration? What is the role of evaluation and timely feedback by instructors? We would like to emphasize that we do not think a formula should be developed for all online instructors to be successful. However, we do know some characteristics of instructor behavior that will guarantee failure. For example, "dumping information" into server software such as Blackboard without "designing the instruction" will almost always guarantee failure (Morrison & Anglin, 2001).

The second area of instructor success research focuses on the instructor's presence in the distance education course. That is, how does the instructor establish an online presence and reduce the barriers created by technology delivery systems to communicate effectively and establish a relationship with the students? If an instructor uses humor in an on-campus course, can this same presence be presented online? In many cases, instructors will become more formal, and their various personalities do not have a presence online. Are there effective ways to teach online instructors how to be effective facilitators? How does body language and eye contact affect student affective responses and achievement?

Instructional Design Strategies

There are also many questions that need to be addressed concerning effective instructional design strategies for distributed learning systems. Will traditional instructional design models work for online learning? Do they need to be altered for distance education courses? We certainly want to use what we already know about how people learn and how to design effective instruction when designing distance instruction programs. However, the virtual classroom is different from the on campus classroom. Consider the issue of interactivity, student-to-student, instructor-to-student, and student-to-instructor. In an on-campus class, much of the interaction happens by default. For example, students who attend graduate school on a full-time basis on a college campus interact both with each other and with their professors and other individuals on campus in many contexts includ-

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ing class, office hours, in dorms, at the student union, at apartments, in study groups, and at the local pub. When designing online instruction, the designer cannot assume that interaction will automatically take place. If this assumption is made, in many cases, the students feel isolated and unsure if they are on the "right path." Interactivity needs to be designed into the instruction. What strategies are effective for designing interaction into online courses—not only "in class" interactions, but other interactions? What are efficient and effective ways to use email, chat rooms, and threaded discussions in web-based courses? How can we design effective group-work in online courses? The issue of interactivity is a critical instructional design research issue.

Summary

Distance education students, instructors, and instructional designers will have to make many adaptations in order to be successful in a distributed learning environment. We believe that investigations studying adaptations that they will have to make to be successful would significantly add to our knowledge base concerning successful implementation of distributed learning systems. This type of research is particularly appropriate given that many students, instructors and facilitators, and instructional designers were instructed in ways that will not work in a distance-learning environment.

Evaluation

Evaluation is a critical component of any instructional activity. In this section, we discuss three major foci of evaluation research.

Student Assessment

The first focus of evaluation research is on student assessment in a distance education environment. Anglin and Morrison (2000) found that only a handful of distance learning studies using any research methodology included measures of student learning. We assume the primary purpose of any course, workshop, or instruction is to facilitate student learning. Given this assumption, there is a significant gap in the research literature concerning the evaluation of distance learning courses and programs. Most of the evaluation studies we included in our analysis of the distance learning literature included participant reaction surveys at the course level. Evaluation studies of distance learning courses need to be conducted that include student-learning measures. If we do not know if students achieved the objectives in a distance instruction experience, we have failed to determine whether the primary goals of the course were accomplished. We are not arguing here for a particular instructional

design and learning assessment approach. For example, we would still argue that student learning should be assessed, whatever the type of learning outcomes are (e.g., if an objectivist or a constructivist epistemology is assumed). Another issue is the format of the learning assessments. In a traditional classroom assessment, each student's learning is assessed individually. The prototype assessment is the in-class test. Given our earlier discussion of the importance of group work and collaboration, we may need to reconsider our individual approach to assessment. It might be more appropriate to assess learning by evaluating group projects as opposed to proctored written examinations. As part of the assessment, we might even have group members evaluate each other. Another issue is the use of alternative assessments in distance education courses and how they can be applied. The primary point here is that we used to evaluate individuals, and if they worked together on the assessment (the test), we called it "cheating"; now, we call it collaboration. We think future evaluation studies should include learning assessments, and the type of assessments used (e.g., individual proctored examination vs. products of collaborative groups) should also be examined.

Course Evaluation

The second evaluation research focus is on course evaluation. We do think that it is still appropriate to evaluate courses from the perspective of student satisfaction. We seem to have this type of evaluation research under control, given the preponderance of such studies in the literature. However, the return rate needs to be acceptable, and the purpose of the survey research should be to assess student attitudes and motivation or to discover unanticipated benefits of a particular course (Clark, 2000).

In future studies, the evaluation of the instructional designs used for distributed learning courses should also be evaluated. For example, many web-based courses are delivered using various server software including WebCT and Blackboard. In many cases, information is "shoveled" into the server software without any consideration of what we know about instructional design from any perspective. A method for determining whether web-based instruction is actually "instructionally designed" from any perspective is discussed by Morrison and Anglin (2001). There is a significant need to evaluate the instructional designs used for distance learning courses based on our existing knowledge of best instructional design practices.

Program Evaluation

Berge and Mrozowski (2001) have pointed out two additional areas that have not received attention by distance learning researchers. Much of the research has been done at the course level. Additional evaluation studies need to be done at the program level. It is important to evaluate individual

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courses, but it is probably more important to determine if an entire distance education program is effective. Berge and Mrozowski also indicate that much of the research on the impact of technology "focuses on the impact of individual technologies rather than on the interaction of multiple technologies" (p. 17). It is also important to evaluate the effects of various delivery technologies in various contexts. Context can be a critical variable related to the success of any delivery technology.

Globalization and Cultural Diversity

The Internet gives individuals and institutions the opportunity to deliver courses throughout the world. The audiences for such courses can be heterogeneous, living in different cultures and countries, having different ethnic backgrounds, and speaking different languages. How do we design and deliver effective distance education programs to such a heterogeneous group of people? Even within one culture, there are many different subcultures. For example, there are many groups of people in the United States interested in designing distance-learning programs. However, each group has its own value system. Examples of these different groups would be public school classroom teachers, public school administrators, trainers in private sector organizations, higher education faculty, and higher education administrators, to name a few. Individuals in each of these groups have different ideas about how teaching and learning should occur. It is important for distance education researchers to study the effect of globalization and cultural differences on the success of distributed learning courses and programs (Richey & Morrison, 2002). In addition to the difference in values of individuals designing distance education programs, the student audience for distance learning programs is also increasingly diverse. They can be diverse in terms of culture, aptitude patterns, socio-economic status, and native country and language. Research needs to be conducted that reveals the effect of the cultural diversity of students on the success or failure of distance education courses and programs. Hopefully, critical variables can be identified that will help distance-learning instructors, instructional designers, and designers of delivery technology design and effectively deliver distance learning courses for a diverse group of learners.

Access and Equity

Information can empower the individuals who have access to it. With the new instructional delivery technologies, it is possible to deliver instruction to almost any place and any time. Calder (2000) suggests that "widen-

ing participation in education and training is now seen as an economic and social imperative" (p. 10). Distance learning programs have a great potential to reduce the gap between the "haves" and the "have nots." On the other hand, there is also the possibility that technology can increase inequities between groups of people with increasing speed. For example, consider the difference between public school students who are asked to write a paper on the physics of a spring. A student that has access to the Internet at school or at home will find considerable information about the physics of a spring. A student who does not have access to the Internet will have access to fewer resources. Distance education researchers need to recognize the problems that we face concerning assess and equity. We need to do research that will help up identify problems with access and equity and solutions so that everyone will benefit from distance learning programs. We are aware that issues of access and equity are not problems that can be solved within the field of distance education. There are political and monetary issues that are beyond our control. However, if we develop a coherent knowledge base concerning issues of access and equity, we will be in a better position to convince policy makers that the problem exists and that it needs to be solved.

Policy Issues

As we have discussed, distance education practice is "racing" ahead of distance education theory. We make the same argument concerning policy issues and distance education. As organizations move quickly into the design, development, and delivery of web-based courses and programs, the development of policies for distance education within organizations is occurring at a much slower rate, if at all in some cases. There is a need for significant policy research in distance education using higher education as an example. Many universities and colleges are delivering new distance learning programs using web delivery and/or compressed video. There are so many policy issues that need to be studied that we can only list a few given space limitations. Policy issues that need to be addressed include faculty views on the design of courses, intellectual property, teaching load and ownership of materials, admission issues, accreditation, access to university resources, student evaluation, faculty selection and compensation, transfer and acceptance of credits, student access to decision makers, and the process for developing and getting courses approved for distance delivery. There are many distance learning policy issues that need to be addressed in various educational organizations. There is a significant need for inquiry in this area given that practice has preceded the development of policies for distance education.

Impact of Technology on the Character of Education

The use of instructional and delivery technologies is becoming a pervasive component of many educational and training organizations. For example, course and program delivery on the Web is now quite common. There are many views concerning the impact of technology in general and its impact on education in particular. Ihde (1986) describes the tradition of scientific enlightenment:

> It is the view that up until the rise of modern science the world was clothed in ignorance and superstition. Once science arrived, it began to strive towards true knowledge which becomes ever more widespread and total, so that it is only a matter of time before we will unravel the secrets of everything. In its wake will follow, naturally, social progress, ease of work, and individual fulfillment, perhaps even everlasting life (p. 95).

Ihde (1986) suggests that in the 19th century, we assumed that science and technology would promote universal progress, but that in the 20th century, we have begun to question the assumptions and identify some of the negative impacts of the tradition of scientific enlightenment. Ihde identifies such issues as "global pollution leading to the greenhouse effect" and the "potential for nuclear war" as examples (p. 100).

In the distance education field, inquiry concerning the positive and negative impact of both delivery technologies and instructional technologies is needed. Any instructional technology will have both positive and negative intended and unintended outcomes. As Bowers (1988) has argued, technology is not neutral. While focusing on the computer, Bowers argues that the use of computer technology promotes and sustains the view of knowledge as power and that it will take us down the path of universal progress in education. Bowers also suggests, however, that we may lose a sense of community in the process.

If technology is not neutral, then when we use instructional technology and delivery technology, the technology itself has a major impact on our conceptions of instruction and information. For example, it is very limiting to define information as anything that can be coded as a 0 or a 1.

Weinberger (2002) argues that the Web is transforming our social institutions and also our conceptions of "space," "time," "perfection," "togetherness," "knowledge," "matter," and "hope." We assume all of these conceptions are significant in an educational process. For example, in distance education, for programs delivered on the Web, how do we conceive of space, time, and knowledge? Are these conceptions the same for traditional class instruction? What are both the positive and negative impacts of web-based technologies of instruction?

There is a significant need in distance education research to examine issues such as the positive and negative impact of both instructional and delivery technologies. Technology clearly has an impact on the character of education.

We assume that any technology of instruction is not neutral and that it is necessary to explore the implications of the non-neutrality of educational and delivery technologies on our conception of education. Finally, we certainly think inquiry into the impact of technology—particularly web-based instruction on our conceptions of space, time, and knowledge—merit attention by distance education scholars. Given that distance education practice is racing ahead of distance education theory, it is important to examine the assumptions underlying our practice and to examine how our practice and the use of instructional and delivery technologies impact and change our conceptions of education.

SUMMARY AND CONCLUSIONS

In this chapter, we first presented several perspectives on how to define distance education. We believe it is important that researchers define distance education before they proceed to develop theories and conduct primary research studies. We then discussed the issues of theory development and distance education, presented the results of two reviews of the distance education literature, and discussed the value of three types of inquiry (i.e., basic research, applied research, and evaluation). Next, we discussed research methods that we think will be particularly useful to expand our knowledge of distance education theory and practice and identified some questions that we believe need to be addressed. Finally, we identified and discussed six additional topic areas that we think warrant the attention of distance education scholars including adaptations for learners, instructors, and instructional designers, evaluation (student, course, program), globalization and cultural diversity, access and equity, policy issues, and the impact of technology on the fabric of education. We believe that there is a significant need for programs of research to be expanded and developed in all of the areas we have identified.

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CHAPTER 9

WHAT MAKES ONLINE LEARNING COMMUNITIES SUCCESSFUL?

The Role of Collaborative Learning in Social and Intellectual Development

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ABSTRACT

This chapter discusses a conceptual framework, the research methodology, and the results of empirical studies conducted to identify effective strategies for online learning. The author employs the notion of discourse as central to knowledge building and views learning as a social, negotiated, consensual process. The theoretical and methodological frameworks are discussed to help us understand learning effectiveness in online environments. These frameworks are integrally linked to understanding how and under what circumstances collaboration and discourse contribute to learning. The chapter draws on the processes of democratic participation, intellectual progress,

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and gradual convergence to adumbrate the trajectory of online learning from idea generation to idea linking to intellectual convergence. How moderator functions can support intellectual and social development (discourse, conceptual change, and intellectual convergence) in online seminars are also discussed.

INTRODUCTION

The terms *communication* and *community* derive from a common root: the Latin word *communicare* which means "to share." Sharing is arguably the keystone of human civilization. Community networks are an integral part of human civilization, providing the basis for our survival and development.

The invention of computer networks in the late 1960s (especially the invention of email and computer conferencing in the early 1970s) had a profound impact, transforming not only technological opportunities but societal possibilities, thereby fundamentally revolutionizing our conceptualization of and ability to forge new forms of community. Online communities are proliferating globally across intellectual, social, recreational, and especially educational sectors. The Internet, moreover, has triggered an educational paradigm shift as the importance of social interaction, collaborative learning, and learning communities comes to the forefront of educational endeavors.

Interest in online learning communities has been especially propelled by the spectacular growth of the Web in the 1990s and its subsequent widescale adoption and adaptation by educators, scientists, and researchers as new ways to collaborate. Nonetheless, while the explosive growth of online communities was triggered by the Web in the mid-1990s, the very origins of computer networking in the late 1960s was the pursuit of mechanisms to facilitate "the meeting of minds" across time and space (Hafner & Lyon, 1996). Among the first books on social applications of the Internet was *The Network Nation* (Hiltz & Turoff, 1978), which describes Turoff's invention of computer conferencing in 1971 and the use of this system by the mid-1970s to link scientists around the United States in what is likely the first online learning community. It is also one of the very first social applications of computer communications.

Growing interest in collaboration complements in important ways our understanding of online education or e-learning, especially with respect to the use of networks for community, knowledge networking, and conceptual change (Harasim, Hiltz, Teles, & Turoff, 1995) and significantly contributes to the recognition that we need a better understanding of the conditions and means for achieving effective learning. Brown (1989) viewed new online educational environments as part of the shift from using

technology as a delivery system to using it as a means to support collaboration and the mutual construction of understanding. A critical question emerges: How can the online environment support the conversations and shared explorations that form part of the user's active (co-)production of knowledge? This chapter addresses this question, especially exploring what makes online learning communities successful. It focuses on the role of collaboration and discourse and proposes some indicators of success. The chapter provides a theoretical and methodological framework for understanding intellectual and social development in online learning communities using the example of the Global Educators' Network, an online learning community that describes itself as "for online educators, by online educators."

THEORETICAL FRAMEWORK

New theoretical frameworks have been developed over the past two decades in an effort to understand how collaboration and discourse contribute to learning and under what circumstances, in face-to-face environments and increasingly as related to online environments.

Researchers have come to focus on how collaborative learning contributes to educational effectiveness at the cognitive and social levels. Findings indicate that collaboration facilitates higher developmental levels in learners than by the same individuals working alone (Johnson, Maruyama, Johnson, Nelson, & Skon, 1981; Stodolsky, 1984; Webb, 1989). Conversation, argument, and multiple perspectives that arise in groups contribute to such cognitive processes as verbalization, cognitive restructuring, and conflict resolution.

There are also critical social or motivational factors involved in collaborative learning, such as the reduction of uncertainty as learners find their way through complex activities (Webb, 1989) and increased engagement with the learning process as a result of peer interaction and collaboration (Cohen, 1984).

Bruffee (1999) argues that knowledge is a construct of the community's form of discourse, maintained by local consensus and subject to endless conversation. Learning is a social, negotiated, consensual process in which discourse plays a key role. Bruffee presents a process in which students collaborate in small groups, then in larger or plenary groups to increasingly come to intellectual convergence (even if that means agreeing to disagree), and through this process, they approximate the substantive and procedural language of the knowledge community towards which they aspire. Thomas Kuhn (1970) similarly argued that scientific knowledge

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changes as scientists revise the conversation among themselves and reorganize their relations.

Roschelle (1996) posits that the "crux of learning by collaboration is convergence," a process of mutual construction of knowledge. More specifically, Roschelle argued that

> Democratic participation, intellectual progress, and gradual convergence are base attributes of social inquiry practices that enable scientists to undergo conceptual change. A convergent account alone suggests the attractive possibility that students develop their concepts in the course of learning to participate in the practices of inquiry that scientists themselves use to develop scientific concepts (p. 245).

These theoretical developments were associated with face-to-face (f2f) learning environments, although Roschelle did focus on how students worked together in f2f environments such as computer labs.

Harasim's (1990) model of conceptual change focused on collaborative learning in the online (web-based) discourse environment, identifying three processes/phases describing the path from divergent to convergent thinking. The three processes identified by Harasim (1990) are theoretically complementary to those of Roschelle (1996), focusing on collaboration as a key process in conceptual change. Although identified and developed in different contexts from one another, both resonate with Bruffee's (1999) theoretical position that intellectual convergence through collaborative discourse is key and in combination suggest a framework for understanding discourse in online seminars. Below is a new framework that builds upon previous formulations and incorporates a communication process.

Idea Generating

The first process, idea generating, implies divergent thinking, brainstorming, verbalization, and thus, sharing of ideas and positions. Participants engage and contribute. Indicators include verbalization, divergent thinking activities such as brainstorming, generating input, generating information, and general democratic participation.

Idea Linking

The second process, idea linking, provides evidence of conceptual change, intellectual progress, and the beginning of convergence as new or different ideas become clarified and identified and clustered into various

positions (agreement/disagreement; questioning/elaboration). This is an early form of convergence, a mutual contribution to and construction of shared knowledge and understanding. This phase involves organizing and elaborating various ideas into intellectual positions or clusters and demonstrating intellectual progress through recognizing multiple perspectives and how these do or do not relate to one another.

Intellectual Convergence

The third phase, intellectual convergence, is typically reflected in shared understanding (including agreeing to disagree) and is especially evident in co-production, whether a theory, a publication, an assignment, a work of art, or a similar output authored by the group or subgroup. Idea structuring, through gradual convergence, reaches a level of intellectual synthesis, understanding and consensus, agreeing to disagree, and/or co-production.

Figure 9.1 illustrates the three stages of collaborative discourse from *idea generating* to *intellectual convergence*. At the *idea generating* stage, individual participants, represented by squares, contribute their ideas and opinions, represented by circles, on the topics to the shared space, represented by an oval. Through the process of brainstorming, the participants begin to relate with each other's ideas. This leads to the second stage of the discourse—*idea linking*. At this stage, the participants begin to agree or to disagree, clarify and elaborate, and reflect and organize their own and others' ideas and positions. As a result, discrete ideas start to come together; many smaller ideas become a few big ones; individual understandings grow into group-shared understanding. At this point, the discourse is ready to advance to the next level—*intellectual convergence*. At this third stage, the

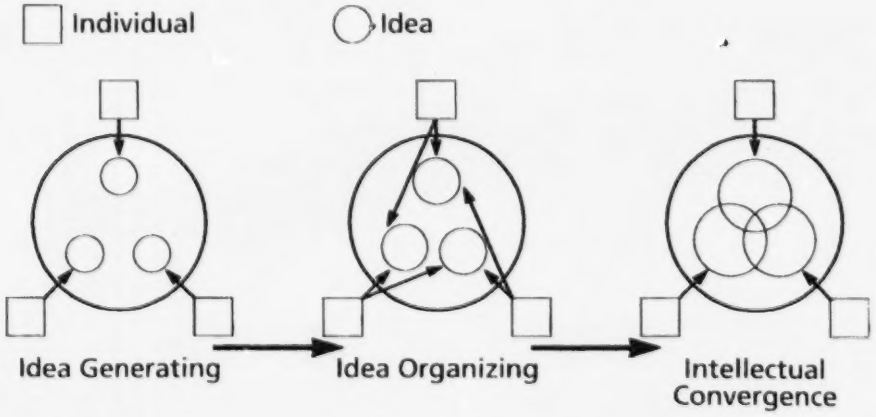

Figure 9.1. Stages of Learning and Collaborative Knowledge Work.

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group actively engages the co-construction of the knowledge based on shared understanding. The group members synthesize their ideas and knowledge into explicit points of view or products (e.g., theories, positions, works of art, manifestos, scientific theories/hypotheses). They may also extend their ideas and understanding to new territories. The outcomes of this stage are consolidated, shared understanding and group convergence as evidenced by co-production.

LEARNING COMMUNITY: COLLABORATION, CREATIVITY, SCIENCE, AND PRACTICE

Discourse and community have contributed to invention and innovation at all levels of intellectual, cultural, artistic, and scientific activities throughout history. Popular portrayals of artistic and scientific creativity as efforts of a lone ranger, a struggling artist, or the solitary genius do not in fact reflect the reality. Collaboration rather than solitary discovery represents the norm. Science and art are "talk" constructed and increasingly defined by collaboration and dispute among specialists and increasingly with the "public." The concept of the learning community is beginning to replace the image of the solitary genius as the sole, primary, or even preferred source of creativity, science, and innovation.

Farrell (2001) examines how collaborative circles have generated new schools of thought, which were a reaction to traditional or then dominant ways of thinking and behaving (i.e., the Impressionist art movement, Freud's collaboration to generate his new theory of psychoanalysis, or the Suffragette social reform movement). Noting that "artists, writers, composers, scientists, social reformers and other creative people report that a collaborative circle played an indispensable part in their development," Farrell cites a passage from Henry James (1909), which suggests that without a community of peers, creative work is far more difficult.

> The best things come ... from the talents that are members of a group; every man works better when he has companions working in the same line, and yielding to the stimulus of suggestion, comparison, emulation. Great things have of course been done by solitary workers, but they have usually been done with double the pains they would have cost if they had been produced in more genial circumstances (cited in Farrell, 2001, p. 1).

This quote further illuminates a key symbiosis: creativity or intellectual development as a function of both cognitive and social interaction. Farrell himself notes that his observations on the dynamics of collaborative circles was influenced by his own membership in "three collaborative circles in which friendship and collaboration became intertwined" (p. 3).

Brown and Duguid (2000) similarly consider the role of online communities in generating new schools of thought and practice. They portray the history of the Internet as extending a long tradition of communities forming around documents.

> The shared texts as much as anything else gave texture to the notion of a discipline, a profession, or an interest group, though most of the people in these "worlds" knew little of one another directly. ... Communities bound together by texts and a shared disposition towards those texts, as ancient philosophical and religious communities remind us, predate not only the 'Net and the telephone, but even the printing press. Textual communities may be as old as texts themselves. Shared and circulating documents, it seems, have long provided interesting social glue (p. 190).

Brown and Duguid (2000) emphasize the importance of the role of discourse and communication in science, illustrated by the role of the printing press in establishing the Royal Society of Science. Correspondence among the members was key.

> This way of proceeding forms the sharpest contrast between what are thought of today as the early scientists and those who are dismissed as "alchemists." The interests and actions of these two groups often look indistinguishable. But the Royal Society categorically rejected the instinctive secrecy of their predecessors. [The] first publication was, quite aptly, a plea for open publication and commentary (p. 191–192).

The importance of both substantive and social discourse is a key feature of professional communities. Hiltz and Turoff (1978) referred to them as "invisible colleges." Bruffee (1999) referred to them as "knowledge communities." Lave and Wenger (1991) focus on the notion of "communities of practice," in which relatively tightly knit groups of professionals engaged in a common practice, communicated, negotiated, and shared their best practice with one another directly during the course of their work. The notion of the learning community used in this chapter emphasizes openness, flexibility, democratic participation, and commitment to continuous social and intellectual advancement of the field.

GLOBAL EDUCATORS' NETWORK: AN ONLINE LEARNING COMMUNITY

The Global Educators' Network (GEN) is an international community of online educators that aims to encourage educator exchange and to leverage experience and expertise in e-learning models and methods through

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moderated seminars and participant interaction and discussion. Launched in November, 1999, GEN has grown by word of mouth to several thousand members, participating from over 60 countries (as of summer 2002). The primary mission of GEN is to contribute to the best practice and knowledge of learning, particularly through free monthly online seminars (usually of two or three weeks in duration) led by a volunteer moderator on topics of research and practice related to learning and teaching online.

The GEN seminars are a noteworthy case study because of their success. Success at the most basic level is indicated by the fact that the seminar series survives. It has an active and dedicated membership. This is in itself a significant indicator. GEN is one of the few online discussion groups in existence with a core of steadily active and engaged participants over time. Moreover, participation has grown at a significant rate, from an initial membership of fewer than 50 educators to 2000 members within two years. The fact that GEN continues to grow by word of mouth is a testament of its relevance to those interested in the subject of online education worldwide. GEN has come to represent a community of interest, a learning community. It is entirely voluntary, except for a coordinator who organizes the monthly seminars, orients the volunteer moderators, provides assistance to new users, and sends out a monthly email message announcing forthcoming seminar topics and moderators. An important part of the success is due to the GEN coordinator's role in creating and maintaining the social climate and professional relevance of the online community to the field. However, this chapter will focus more narrowly on indicators of success, especially in identifying the social and intellectual growth and progress of an online learning community.

Observations and Results: Indicators of Success

A variety of indicators have been identified to assist in defining the success of an online learning community. Here, we explore contextual indicators (user reports, active participation and longevity, engagement indicators), which provide descriptors of success, and substantive indicators (social discourse, intellectual progress), which provide analytical markers.

Contextual Indicators

User Reports. An important source of data on the success of any network is that of the experiences of the participants. In the case of GEN, data were obtained through such mechanisms as interviews, large-scale surveys, special seminars/conferences on this topic, as well as more informally through unsolicited email and conference comments. Throughout its history, GEN

has sought feedback from participants and incorporated the input into a process of continuous improvement of the GEN design and practice.

An analysis of hundreds of user reports on the GEN experience provides insight into success factors in the GEN community and is synthesized below (Currie, 2001).

- GEN provides an environment for exploration and sharing of ideas, where learning is a collective and participatory process. GEN is unlike traditional teacher professional development, which focuses on individual learning. Rather, collaboration and group learning are emphasized; individual learning is implied, and necessary, for the advancement of knowledge as a group.
- GEN offers new opportunities for dialogue across disciplines, geographical borders, professions, levels of expertise, and education sectors.
- GEN provides a connection to the everyday realities, current thinking, and practices of education professionals. Participants engaged in the GEN seminars and discussions typically draw upon their own experiences to link with, extend, or debate the seminar focus and presentation.
- Participation in GEN is flexible and inclusive. As a web-based and platform-independent environment, members are able to log on from any location and from shared computers.

The VGroups conferencing system (part of the Virtual-U learning software[1]) that hosts GEN is easy to use, allowing participants to focus on the discussion rather than the technology.

- There are no costs associated with membership.
- The asynchronous discussion format allows for members to participate according to their own schedule. Asynchronous discussion is also critical in a global context, to overcome the constraints of time zones.
- There is no obligation to participate according to a set structure. Reading along is acceptable, and members are encouraged to join a discussion at any time that they have time, feel compelled, or feel comfortable. As such, there is an opportunity to become acculturated and ease in gradually if that suits the individual.
- GEN operates on a basis of shared goals and experiences. Facilitators volunteer their time because they are committed to the advancement of both online education and the GEN community itself.
- The community has evolved according to the needs of its members. From its inception, GEN quickly evolved into an international learning community as educators, researchers, administrators, software

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developers, consultants, and students came to appreciate the value of engaging in timely discussions. New events are scheduled by topic, so there is always something new and fresh to build expectations. Many of the proposed seminar topics emerge through former discussions, and many participants take on new roles as leaders and facilitators.

Active Participation, Stability, and Longevity. An empirical indicator of GEN's success is the active participation by GEN members. During the first period of 24 months, 6000 messages were generated in GEN seminars and related activities. During this same time period, GEN hosted:

- 44 seminars, averaging 100 messages each.
- 23 meta-conferences to orient volunteer moderators, averaging 38 messages per conference.
- Numerous discussions on various topics for special interest groups.

It is worthy of note that participation in GEN is fairly stable year round. Seasonal variability or fluctuations may account for some differentiation, but this is relatively minor. The character of participation that has evolved is:

- A small core of GEN participants, active in most (and in some cases all) of the GEN seminars.
- A larger group, regularly active in about 50% of the seminars.
- Long time GEN participants who surface depending on their interest in a particular topic.
- New members/participants, attracted to GEN or a particular topic (who have not yet demonstrated a particular pattern of communal behavior).

Hence, different topics attract different individuals from the GEN participant pool. It seems that the topic and, in some cases, the quality of the moderating appear to be more significant factors affecting the level of participation than seasonal variations. The fact that GEN is global also contributes to a relatively active rate of participation even during "summer holidays" in the northern hemisphere.

Engagement Indicators. User "engagement" offers another view on success in online communities. GEN participants demonstrate engagement to the community in a multitude of ways. Certainly active participation is an important indicator, but there are many others.

One intriguing phenomenon is "active lurking." Unlike typical online credit courses and seminars in which participants are encouraged by the learning design to engage in active reading *and* writing messages to the conference, GEN has no such external motivation. Nonetheless, a core of GEN participants remain active and involved. Moreover, a new phenome-

non of active lurking has been observed. Many members remain active readers but not active writers to conferences. They regularly and actively read the messages and remain current with the communication flows, and from time to time, they surface as active contributors, depending presumably on the subject matter.

Another type of engagement is demonstrated by volunteering to take on new or special roles. For example, members often volunteer to moderate a seminar or propose topics for discussions that they would enjoy learning more about. Moreover, seminar participants will assume moderating functions, even if they are not moderators. They will assist in advancing the discussion, clarifying a concept, and adding new insights. GEN members will also assume moderating functions in the form of welcoming new participants or providing technical, social, or netiquette assistance to the group. Participants often share their favorite resources, tips, URLs, and references, thereby both contributing to community building and enhancing the quality of the discussion. Some have voluntarily taken on larger roles such as organizing URLs and links by topic by weaving key themes in a seminar. GEN members have collaborated to make presentations about GEN at both academic and professional conferences. Furthermore, it is the existing GEN members who bring in new members.

Community friendship is important; members organize to meet if they are traveling to the same city. Members have also been responsible for linking communities. A very powerful example is the linking of GEN with the TAPPED IN network. Both are online communities, but GEN is an asynchronous environment, whereas TAPPED IN is a synchronous environment for educational communication and sharing. Nonetheless, GEN has hosted events with TAPPED IN and vice versa. Each community has also enjoyed membership growth from the other. GEN has also served as an online component to face-to-face conferences. It has also become home to several Special Interest Groups (SIGs).

Substantive Indicators

While successful learning communities are generally identified by positive user reports, participant engagement and activity, and general population stability and longevity, it is essential to understand how and whether the community is advancing socially and intellectually. Indicators of success for social and cognitive development in virtual learning communities *are key.*

Social Indicators of Success. Social comments, interactions, and ultimately friendships form a glue for all communities and a motivation to participate regularly. Social discourse is present in each and every GEN seminar. The volume of social exchange ranges from 20% to 40% of the total exchange. Social comments are typically part of a message, often as a

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prelude to the more substantive contribution. Rare are messages that are entirely social, without any reference to the topic of discussion.

Social, often humorous discourse seems to be a mechanism for participants to connect with one another, even if they have never met f2f or are new to a seminar. Such informal comments both spice up the discussion and reduce anxiety or pressure related to discussing a particular topic. Such comments invite responses and create a sense of commonality and welcome. Typically, social comments include the following:

- Statements related to welcoming and self introductions.
- Comments about the weather (i.e., complaints about snowy Ontario; interest in sunny South Africa!).
- Humor and joking (usually self-effacing).

In a GEN conference on the topic of virtual communities, several participants emphasized the importance of trust in the intellectual processes of idea sharing, linking, and convergence. One participant, stated the following:

> During a sharing phase, you test the waters ... and experience how vulnerably others in the group share themselves. This builds trust and relief leading to confidence (or not) about offering your own linkages (thinking). Eventually, linkages (or not) to building (and agreeing to disagree or to agree) and/or holding multiple perspectives as a way of appreciating and better understanding the complexity of things—once depth of understanding is collectively sought.
>
> I sense that the measure of every step on this path is related to a collective culture of trust. Growth plays itself out in the later stages via the way that conflict among participants is received and engaged, leading to more or less trust and resulting in continued or less engagement.

Another comment reflected a participant's experience with a new community, which, as the above participant notes, illuminates important ideas about building more effective and valuable discourse online:

> I was fascinated to watch how this group managed to (a) make me feel welcome in a field I know nothing about, and (b) convey sufficient atmosphere of trust that I could 'fess up to ignorance of things ... and seek help. What I saw was that people were extremely gentle with one another, and forthcoming about their own anxieties, confusions, failures, crises, and deepest desires. People revealed. And in that revelation, they made themselves vulnerable. Others, like myself, could see that no one was going to attack vulnerable people.

Social commentary should not be confused with comments that are viewed as having a lack of significance to the group. Vacuous, empty comments are not valued: "I really like how Sylvia honed what I was talking about here." Empty praise postings (or any kind of empty reaction posts) do not contribute to the cognitive work being done and can be distracting/time-consuming. A different post will indicate how a participant can agree with a posting in a more meaningful way:

> But I really appreciate the concern Sylvia raises about how important it is that there is room for at least some of those community-building, supportive listening reactions. I realize it may not work in all online venues, but in a course where there are a number of discussions available only to the class community, we have found that people learn to and are often willing to bring their "more about your lizard group-type" postings to the "Virtual Cafe" with a subject line and maybe a hyperlink that points back to the comment that initiates the more playful or sideline reactions. Would this work for you?

Typically, social comments are most prevalent at the beginning of a seminar, as a form of ice-breaking and self-introduction. Again, at the end of the seminar, participants make concluding remarks and reference colleagues in the discussion and comment on the quality of the discussion and/or moderating, bringing that topic to an end and saying "good-byes."

Intellectual or Cognitive Development of the Learning Community

Social relationships form an important part of the "glue" of a community. Nonetheless, in professional or learning communities, such as GEN, the magnet is the topic and the quality of the discourse. The discourse is the draw. Here, we provide a framework that incorporates both quantitative and qualitative indicators of intellectual progress and conceptual change to study the community discourse. Analysis was conducted using both log file and header analysis (quantitative usage and participation analysis) and message transcript analysis (using Atlas Ti, a qualitative analysis application) to identify the three communication processes and the corresponding cognitive acts.

Phase 1: Idea Generating. Both quantity and quality of messages are potential indicators of success. This is not to confound quantity with quality of discourse. The number of messages or message size sent by a participant is neither the best nor worst indicator of learning effectiveness and engagement. Message quantity should not be dismissed as superficial. It is an important indicator of level of participation and hence engagement. It is also important in assessing or reflecting the level of democratic participation, verbalization, and brainstorming (divergent thinking) in a group. Student posting of messages in an environment that explicitly values both a

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certain level of active engagement and a quality of input is a very important indicator in gauging the level of active learning.

The GEN seminars each demonstrate a high quantity of active participants (i.e., participants who post at least three messages and log in at least five times a week). Most participants in a given seminar are active by this definition.

Another indicator of Phase 1 learning or conceptual change, especially with regards to verbalization and democratic participation, has to do with the distribution of contributions among participants. Democratic participation and input distinguish collaborative learning and conceptual change from the lecture or one-to-many model.

Quality of message is another key indicator. Phase 1 messages typically initiate new ideas and perspectives and hence are categorized as divergent thinking, whereby participants present individual points of view and hence generate a multiplicity of perspectives. The kinds of messages typical in this phase include the following:

- *Introductions/initiations/contextualizations.* A seminar begins with introductions to the seminar topic by the moderator and sets the tone and norms for the discussion. Participants respond with self-introductions: "*my name is so and so, and I work at such and such.*" This typically provides a context for presenting their response to the discussion topic.
- *Introducing ideas and understandings.* New ideas, beginnings of threads, and new topics are introduced.
- *General information.* Information about resources, jobs, and personal strategies is given.
- *Opinion.* Personal opinions are given about a topic.
- *Examples.* Personal examples are used to illustrate a position, a particular point or start a debate, etc.

Phase 2: Idea Linking. Phase 2 activities are characterized by messages in which users begin to link ideas, identifying where ideas may be clustered as either similar or not, thereby moving from individual comments to collaboration. Indicators of idea linking include the following:

- Increased number of reply messages.
- Increased number of references to previous messages.
- Increased number of name referencing.
- Qualitative changes in the nature of the discourse.

The examples that follow are intended to be diagnostic rather than prescriptive:

- *Agreement/Disagreement.* Often accompanied by the use of a name (e.g., "*Michelle, your comment really got me pondering this issue because I*

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don't see it the same way. Can you tell us more about your concerns on this issue?").

- *Enhanced Individual Understanding*: Exemplified by such comments as "now I understand," especially when incorporating new perspectives/ideas into one's thinking, or elaborating an existing idea with an example, an application, or further questioning.
- *Shared Understandings*: Enhanced individual understanding connects with the collective understanding of terms and/or frameworks. One example is that of weaving or summary. Summation of ideas is exemplified by a variety of comments, such as "This discussion has been valuable in the focus on xxx ... what about some of the related issues such as yyy?" Collison, Elbaum, Haavind, and Tinker (2000) note the importance of summation as authoritative, rather than authoritarian to keep doors open and continue exploration of new ideas more readily (p. 24–5).
- *Elaboration on Ideas*: Elaboration is another important marker of collaboration. "We find things are really cooking if an author pulls a piece from here and a piece from there, citing more than one previous contributor and weaving multiple ideas together. Often, the most powerful of these kinds of posts offers an analogy that takes off in the community as particularly explaining of explored phenomenon" (Collison et al., 2000).
- *Quoting, then Commenting*: Provides a short quote, then elaboration. For example, "Bruno, you said that 'such and such' and it makes me wonder how it would fit in the case of that and that?" This indicator frequently employs the conjunctive case of *and*, *but*, and *or*, signaling a linking and building upon an idea or point of view.

Phase 3: Intellectual Convergence. Phase 3 is indicated by an increased level of density:

- An increased number of substantive contributions. (e.g., messages that compare, structure, extend, and synthesize ideas).
- An increased number of conclusive supported position statements.

Typically convergence is most evident when participants are engaged in co-production, whether it be producing a report, a presentation, a point of view, a work of art, or a scientific theory. Few GEN seminars are focused on co-production, but there are cases in which the seminar is directed to organizing a panel presentation (holding pre-panel discussions as well as panel preparations) or on identifying common doctrines or positions. An example of such discourse would be, "Thanks Mary for keeping us focused on making good use of our one-hour panel at the conference next month. I like the ideas that you, Tom, and Elizabeth have been gelling about debat-

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able topics that we panelists could discuss, citing examples from our own experiences with online learning."

What follows is an excerpt of an online exchange on the topic of summaries, landscapes, and sidelines.

Summaries/Landscape

"Anyway, we've been talking about effective strategies for summarizing - who should summarize, when, and should there be a term other than "summary." One suggestion is to have a "sideline" type of ongoing summary. (I feel like I'm not explaining this very well!—need pictures!) Have you used similar tools/strategies in your work?

Subject: landscapes instead of summaries

Hi Sylvia,

We've found the term "landscapes" more useful for this kind of work because the term is not so value-laden or argument-based as a "summary" which is a lens particular to the author (traditionally the group leader, instructor or chief administrator in a business meeting "summarizes" what's been established to this point—from their view).

In describing a landscape, there is more of a sense of the whole in a descriptive sort of way which lessens the pressure for others (readers, in our case) to release other pieces they might have thought worthy until a "summary" was made. Specifically, an author can describe a piece of the landscape, thus leaving it open to bring up and further unpack/explore/re-visit other pieces because they haven't been "discounted" (it's a tone thing more than anything else) in the same way as a summary tends to shed whatever is left out.

It also doesn't require any new "design" features (like a sideline suggests to me, are you thinking of a sort of extra left-hand column?), just training in listening-oriented collaboration.

Extended Shared Understandings

Landscape. I like it! It also sent sparks across my synapses and prompted me to revisit Spiro et al's Cognitive Flexibility Theory, where they refer to criss-crossing the landscape to describe the nonlinear and multidimensional nature of hypermedia environments. It provides opportunities to explore the landscape, returning to the same place at different times with new ideas and perspectives.

And you read my mind well, Sarah! I was thinking about a sideline tool—something to facilitate the process of pulling out (more like linking to) bits and pieces. But that may be complicating a process that can be achieved nicely within the discussion space itself. Just traversing the landscape of this discussion I continue to pick up new gems I hadn't noticed before, or understand earlier comments a little better now that the road has straightened out a little!

Sylvia

CONCLUSIONS: ANALYSIS AND IMPLICATIONS

This chapter explores what makes online learning communities successful; it focuses on the role of collaborative learning in social and intellectual development and provides a theoretical framework, a methodological process, and indicators or markers of success. The chapter identified contextual success indicators and procedural success indicators, focusing on the latter.

Contextual success indicators included the following:

- User reports.
- Engagement indicators.
- Active participation and longevity.

Substantive or analytical success indicators included the following:

- Social discourse.
- Intellectual progress.

There was a variation in quality of the seminars, with some better than others. Nonetheless certain general trends did emerge across the GEN seminars. There is a high volume of moderating activities at the beginning of a conference. This gradually settles down as the discourse momentum builds up in the conferences. There is also a decrease in social activities in seminars after the initial self-introductions and personal greetings conclude. Social interaction does rise again in the concluding days of a seminar.

At the beginning of the conferences, often the first three days to a week, idea generating types of messages dominate the discussion. There is significant verbalization by each participant, articulating a particular point of view on a topic, in response to the moderator's message or to a message by another participant. There is a definite initial phase of brainstorming, generating ideas, and positing points of view or in some cases more articulated positions. During this stage, participants relate their personal experiences, ideas, or opinions on the topic. Ideas at this stage are discrete or loosely connected.

Social discourse is particularly evident in the initial phase of each seminar. Significant effort is undertaken by the moderator and by members of the group to provide a welcoming social environment; pleasantries, greetings, and welcomes to new members are common during this phase.

Idea generating is immediately followed by a sharp increase in idea linking activities. There is a change in the nature of the discourse that is quite distinct. In this second phase, participants begin to reply more specifically to one another's contributions.

As the participants come to know one another, they shift their attention from social chatting to more content-based discussion. It also suggests that establishing a friendly social environment is important before the group

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engages in more serious cognitive activities. Through the process of articulating, debating, and co-construction, they advance their understanding of the topic, their own thinking and stances, and those of the others. Idea generating and idea linking may be said to be the prevalent mode of discourse in the seminars.

The third phase of discourse, intellectual convergence, is less common in the GEN seminars. Nonetheless, messages embodying intellectual convergence are evident in all seminars: fewer quantitatively than idea generating or idea linking, yet present throughout. Interestingly, convergent type comments appear around day 10 of a seminar and then peak again towards the end of a seminar.

Depending on the topic, the level of knowledge among participants, or possibly the quality of the moderating, the peaks and valleys are different. Nonetheless, all seminars have certain common characteristics:

- Idea generating is high at the beginning of a seminar, as participants introduce themselves and their particular position.
- Idea linking becomes increasingly prevalent, not replacing idea generating comments but predominating by about week 2.
- Intellectual convergent messages appear throughout the seminar, beginning by the end of week 1. These do not become the dominant type of discourse, but are evident throughout a seminar and typically peak towards the end of the seminar at week 3.
- Social comments exist throughout a seminar but are a fraction of the total types of comments. Social interactions are most common during the introduction and the conclusion of a seminar.

While the GEN seminars are typically discussion-oriented, there have been some differentiations of seminar type. For example, a few seminars could be described as online workshops, through which new skills or concepts were introduced and participants engaged in activities to apply the new skills. Yet, another type of seminar combined general discussion of a topic with preparations for a panel presentation at a f2f conference. What distinguishes the discourse in this type of seminar is the clear task to be accomplished within a set timeline. Transcript analysis distinguishes strong movement towards convergence around a panel format, set of topics, clarity on the positions, and general agreement.

The analysis undertaken for this chapter was conducted on individual GEN seminars. There was no analysis of intellectual or social development across the entire corpus of existing seminars. An analysis across the discussions over an extended time frame (say six months or even two years) is different albeit equally illuminating and potentially highly complementary to the method employed here. Nonetheless, for our purposes, given the changes in the participants for each seminar (although there was a small

consistent core that participated in most seminars), analysis was completed seminar by seminar.

Overall, transcript analysis of GEN seminars demonstrates development along the lines of the three phases. Idea generating and idea linking were the most prevalent types of messages contributed by participants, and they did flow from one to another. Interestingly, intellectual convergence (Phase 3) type messages were identified by the end of week 1 and continued, albeit at a low volume, throughout a seminar. Intellectual convergent messages did peak towards the conclusion of a seminar, but this type of message did not predominate over Phase 1 and 2 type messages.

What explains this pattern? Possibly, it is the nature of the task in GEN conferences that encourages more idea generating and idea linking than intellectual convergence. The "task" of the seminar is open discussion, with some moderating support, but without rules or enforced behaviors. This is a quality that invites and welcomes participation but which does not require formal guidance or compliance. It is mostly free-style conversation aimed to get to know and understand a topic instead of project or product-oriented activities.

Moreover, GEN does not have as its expressed mission the co-production of an activity or project (whether a scientific treatise, a book, a painting, or a manifesto). Hence, there is no external motivation or pressure to converge on a set of ideas or products. Another important factor worth consideration is the duration of a seminar; three weeks on a particular topic may simply be inadequate to lead to significant intellectual convergence.

Finally, with regards to research, it may be worthwhile to examine change over larger chunks of time, such as across a series of seminars over a 6, 12, or even multi-year time period to seek sources of convergence such as changes in the individual intellectual positions over time, via GEN. Indicators might include the following:

- Adoption of common language/terms among a group of cohorts.
- Semantic commonalities that begin to emerge.
- Analytical commonalties, distinct from initial positions.
- Co-production among participants in GEN, but outside of GEN.

NOTE

1. Information on the Virtual-U learning environment can be found at http://www.vlei.com.

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CHAPTER 10

OF NOMADS, POLYGLOTS, AND GLOBAL VILLAGERS

Globalization, Information Technologies, and Critical Education Online

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ABSTRACT

In this chapter, we discuss the reciprocal relationships among the forces of globalization, information technologies, and education, and we critically examine the role of distance education in the 21st century. We argue that

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common metaphors such as the *global village* may not always work when applied to experiences of marginalized people in online communications and thus, regardless of physical access, the online environment can be "exclusionary." We unpack assumptions embedded in this metaphor and suggest alternative ways of articulating our relationship with new technologies. We propose that both the metaphors of the *nomad* (Deleuze & Guattari, 1983, 1987) and the *polyglot* (Braidotti, 1994) suggest an empowering way of conceiving such a relationship because they describe how information technologies can be inclusionary for the underprivileged. Analyzing the metaphors of the nomad and the polyglot sheds light to questions such as the following: Who benefits the most from the growing application of information technology around the world? Who benefits the least? What are the implications of such inequities, for us, our students, and the world? Finally, we examine how critical education online can serve to promote social justice, equity, multicultural education, and peace education. We focus on three ideas that help us redefine our relationship with information technologies: (1) critical emotional literacy, (2) collective witnessing, and (3) collective intelligence.

INTRODUCTION

A variety of social theorists have engaged with the historical phenomenon of globalization, its meaning, and its impact on society, individuals, and social relations. Although there is no agreement among scholars on what globalization means, there are some identifiable characteristics that focus mainly on its impact. Such characteristics include the dominance of a world capitalist economic system, the increased use and reliance on new information and communications technology, the strengthening of transnational corporations and organizations, the erosion of local cultures, values, and traditions, and the emergence of what some call a "global culture" (Giddens, 1990; Kellner, 1998) within a "network society" (Castells, 1996). Kellner (2000, 2002) argues that the key to understanding globalization critically is theorizing it both as a product of technological developments as well as a process of global restructuring of capitalism in which economic, technological, political, and cultural features are intertwined.

Such features also reflect new patterns and implications for how education is changing (e.g., new emerging skills and knowledge, effects on teacher-learner relations, different pedagogical practices, new learning spaces, and constantly evolving technology-mediated social relations). There have been numerous efforts to theorize the impact of globalization on education and educational policy (e.g., see the recent edited volume by Burbules and Torres (2000) and the special issue of *Educational Theory* journal in the Fall of 2000). Several education theorists are skeptical and

"refuse to accept as given the particular forms that globalization is taking and they ask critical questions about the winners and losers by this new set of rules" (Burbules & Torres, 2000, p. 2). We sympathize with such efforts, and we agree that "even as these changes occur, they can change in different, more equitable, and more just ways" (Burbules & Torres, p. 2).

In this chapter, we want to examine how traditional and online education are changing and will need to change in response to new circumstances related to globalization. We discuss the reciprocal relationships among the forces of globalization, information technologies, and education, and we critically examine the role of online education in the 21st century. We suggest that to properly understand education in this global society, one must articulate the implications of globalization and the role of new technologies and emerging pedagogies. Understanding how online education and its emerging pedagogies are creating unique opportunities as well as significant challenges in the global education scene helps one understand the urgency and force of analyses that aim at deconstructing taken-for-granted assumptions about the meaning of education in a global scene.

In the first part of this chapter, we briefly examine the potential impacts of globalization and information technologies on education, emphasizing the political, social, and cultural issues and challenges involved. If we want to understand the impact of globalization and information technologies on education, it is important that we analyze the tensions created between the privileged and the underprivileged.

We focus on the construction of what Morrow and Torres (2000) call "global distance education," and we deconstruct the metaphor of *global village*. Common metaphors such as *global village* may not always work when applied to experiences of marginalized people in web-based communications and thus, regardless of physical access, the online environment can be "exclusionary." Gender, race, and other societal biases do exist even in cyberspace, and new forms of oppression are among the side effects of high-tech growth. We unpack our assumptions embedded in the above metaphor and find alternative ways of articulating our relationship with the new technologies. We propose that the metaphors of the *nomad* (Deleuze & Guattari, 1983, 1987) and the *polyglot* (Braidotti, 1994) suggest an empowering way of conceiving such a relationship because they describe how information technologies can be inclusionary for marginalized people. A nomad is someone who is constantly on the move, connecting with others, assuming heterogeneous identities and celebrating plurality in contradiction to unitary models of Western thought that exclude certain populations. Similarly, a polyglot is a nomad who learns to live better with the discomfort of uncertainty and multiplicity and does not allow himself or herself to collapse his or her identity to that of a global vil-

lager that hypothetically has the same universal needs and desires. Analyzing the metaphors of the nomad and the polyglot sheds light on questions such as the following: Who benefits the most from the growing application of information technology around the world? Who benefits the least? What are the implications of such inequities for us, our students, the world?

In the final part of this chapter, we examine how education can promote social justice, equity, multicultural education, and peace education. We use the ideas of critical emotional literacy, collective witnessing, and collective intelligence to redefine our relationship with information technologies.

GLOBALIZATION, INFORMATION TECHNOLOGIES, AND EDUCATION

In light of the many debates and disagreements over the meaning of globalization, instead of attempting to define globalization, we prefer to describe some of its characteristics, especially those that most closely have an impact on education. These, according to Burbules and Torres (2000) include economic factors (a rise of transnational corporations), political factors (a certain loss of nation-state sovereignty and a weakening of the notion of the "citizen"), cultural factors (a dialectical tension between the local and the global), and educational factors (new education agendas that privilege particular policies for evaluation, financing, assessment, standards, teacher training, curriculum, instruction, and testing).

A common characteristic that makes globalization possible and which affects education in economic, political, and cultural terms, is how much easier and more accessible the flow of commodities, capital, technology, ideas, forms of culture, and people across national boundaries has become (for some, not for all) (Castells, 1996). This flow of goods and capital is more apparent in developed countries rather than developing and underdeveloped countries, thus increasingly broadening the gap between the "haves" and "have nots." Especially the flow of information technologies—which, of course, should not be viewed apart from the flow of other things—is creating new educational spaces or what some call a "globalized and interconnected education" (Kellner, 2000). At the time that information technologies make this globalized and interconnected education possible, the process of education complicates learning, teaching, pedagogies, relationships, and social issues. Thus, it is not clear, for example, how this globalized, "informationalist" (to use Castells' term) education tackles equity and social justice. Yet, this globalized interconnected education has potential for contributing to several aspects of the society and the world. It is on those aspects that we base our argument to suggest that there is hope after all.

We agree with Fabos and Young (1999) that the often overly optimistic claims about information technologies and their use in the classroom are problematic in light of the larger, exceedingly complex role of technology in society. Consequently, we want to argue that in order to properly understand the impact of information technologies on education, one needs to conceptualize the tensions created between "haves" and "have nots." Postman (1993) reminds us that "new technologies alter the structure of our interests: the things we think about. They alter the character of our symbols: the things we think with. And they alter the nature of community: the arena in which thoughts develop" (p. 20). New technologies create new social environments (Baudrillard, 1993), thus we need to recognize technologies as sociopolitical in origin and sociopolitical in consequence (Haraway, 1991). They are political in the sense that perhaps the most central issues around them are struggle, oppression, marginalization, and hope for change.

While it would be ridiculous to argue against the use of information technologies, we do want to critically analyze and problematize the use of information technologies in the classroom. As Fabos and Young (1999) write, we should always be aware and skeptical of the fact that "just as telecommunications technology is credited with promoting multiculturalism, it has also been blamed for increasing existing inequities on a broader scale" (pp. 233–234). Furthermore, Noble (1998) argues that educational efforts on behalf of equity, empowerment, and access for all often serve to advance technological colonization:

> Seductively aligned with (educational efforts on behalf of equity, empowerment and access for all), in rhetoric if not also in practice, is an array of corporate promoters and technologists whose agendas, ultimately have less to do with issues of equity or even of education, broadly conceived, than with furthering technological development (and potential profit) through research and development in the public arena, through the merchandising of hardware and software, and through the reshaping of educational systems both to facilitate their technological colonization and to ensure the training of reliable cadre of adaptable "problem solvers" and technicians. These agendas come with an abundance of resources—both financial and political—that dwarf those available to progressive educators unwilling to adorn their efforts with technological or vocational trappings (p. 269).

If one wishes to move beyond the rhetoric of colonization toward a critical version of education using information technologies—given that teachers are provided with the strategies to develop and enact such critical perspectives—then we believe that distance education can offer important opportunities for creating new discourses and practices within a globalizing world.

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One has to acknowledge that information technologies and distance education offer opportunities that are often not available to a large number of people. For example, Burbules and Callister (2000) argued that in developing economies of Southeast Asia, "access to higher education courses and programs online, and to the other fruits of advanced technology, is regarded as a primary engine of growth, and they are aggressively seeking out quality online educational opportunities from whomever will provide them." There are multiple perspectives and views on how the Web shapes culture and influences countries around the world. Not all are negative (critical) or skeptical about it. For example, people in Palau and Scotland see the Web as a space where they can express, share, and enrich their cultural values (Kitalong & Kitalong, 2000; Sloane & Johnstone, 2000).

These issues pose complex problems for analysis. While the most obvious challenges of the use of information technologies and distance education might be the changing social relations (e.g., distance vs. face-to-face communication), the more provocative issues have to do with the implications in terms of social exclusion, increased cultural colonization, and dramatic shifts in the personal, national, cultural, and ethnic identities. Strategies of teaching and learning for the underprivileged cannot be separated from issues of poverty, oppression, and injustice. But what is the nature of the newly emerged globalized educational communities, and how can one begin to face the implications mentioned above, given the particularities and complexities of those communities? These and other related issues are addressed in the next section.

IMPLICATIONS OF GLOBAL DISTANCE EDUCATION (GDE): NOMADS, POLYGLOTS, AND GLOBAL VILLAGERS

A number of questions and concerns remain unanswered regarding the nature and impact of the increased use of technology in education. What are the most productive avenues for technologically infused pedagogies in distance education? What are the cultural, political, economic, and pedagogical challenges limiting the potential offered by emerging technologies in distance education? Schools and universities have often occupied a central position in traditional knowledge structures. Universities are embedded in regional and national economic spaces, which reflect and reinforce the corresponding divisions of labor in hierarchies of knowledge. One might argue, however, that globalization encourages a less structured approach to knowledge construction and sharing, thus eliminating some of the traditional barriers and gateways to knowledge posed by the traditional university.

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Often, the arguments posed for the expansion of information technologies are based on the grant narrative of the "global village" (Hawisher & Selfe, 2000). The global village narrative envisions that technology brings people, cultures, and civilizations together, forming a neutral and truly democratic society. Talking about the world-wide-web, for example, the questions raised concern the degree to which it is "world-wide." How do culture and sociopolitical contexts affect communication that takes place using the Internet and promote a more democratic and just society? How are information technologies shaped by cultural perspectives? Clearly, we cannot ignore culture when we talk about distance education and information technologies.

First of all, what is the meaning of "global" in GDE? We believe that there are three factors that can make distance education global: (1) the increased availability of education to larger audiences, (2) the increased diversity of student populations around the globe through the use of information technologies, and (3) the increased diversity of the curriculum that is becoming more global in nature (e.g., environmental issues, peace education, and multiculturalism). At the same time, Morrow and Torres (2000), Hawisher and Selfe (2000), and Mason (1998), among others, call into question the claims about the global character of distance education pointing out important problems, such as the emphasis on marketing skills and knowledge that are usable (utilitarianism), the cognitive and often emotional limitations of electronic communication, the contribution of global education to the erosion of local communities and educational systems, and the gradual process of cultural invasion and colonization from the developed to the so called "underdeveloped" parts of the world.

Global Village Narrative

The growth of GDE is often based in the global village narrative. Hawisher and Selfe (2000) argue that

> According to this utopian and ethnocentric narrative [global village narrative], sophisticated computer networks—manufactured by far-sighted scientists and engineers educated within democratic and highly technological cultures—will serve to connect the world's peoples in a vast global community that transcends current geopolitical borders (p. 1–2).

This "technological utopia" (Wresch, 1996) has many critics, especially if one considers that the largest portion of the population of earth does not have access to the Internet. As Deibert (1997) argues, there are deeper

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motives behind claims for the global character and importance of information technologies:

> The global-village myth ... provides a convenient and ideologically effective way of making efforts to expand free market economic development, provide active support of fledging democratic political efforts, and intervene militarily in the affairs of non-western countries. ... To citizens of other countries, however, the global-village myth is far from culturally neutral and understandably much less appealing. The inhabitants of countries traditionally identified as less technologically "developed," for example, may interpret the global expansion of the web within the historical context of colonialism.... To citizens in these countries, the Web may seem less a neutral and welcome medium for global communication than a disturbing and unwelcome system for broadcasting western colonial culture and values (p. 9).

We join Deibert (1997), Hawisher and Selfe (2000), and others in suggesting that there are alternative perspectives to the global village narrative thus expressing our skepticism on the claims made about the possibilities offered by the constitution of a global village. One such alternative that not only exposes some of the problematics raised above but also promises some hope is what we call the *nomadic narrative*, inspired by Deleuze and Guatarri (1983, 1987) and Braidotti's (1994) work on "nomadic thought." We first analyze the meaning(s) entailed in this narrative and then examine why, in our view, there are great possibilities for promoting critical education in the context of GDE, despite the limitations of this narrative. We propose that instead of the global villager metaphor, the metaphors of the nomad and the polyglot suggest an empowering way of analyzing our relationship with new technologies, because they describe how information technologies can be inclusionary.

Nomadic Thought Narrative

It has been four decades since McLuhan (1964) pointed out that we are "suddenly nomadic gatherers of knowledge, nomadic as never before, informed as never before, free from fragmented specialism as never before—but also involved in the total social process as never before" (p. 358). Deleuze and Guattari (1983, 1987) have theorized about the developments of new spaces in global communication and described the changed perceptions and political meanings of these spaces considering them as "non-hierarchical" and "nomadic." Deleuze and Guattari's (1987) *A Thousand Plateaus: Capitalism and Schizophrenia* is particularly appropriate to discussions of the Internet and information technologies because it provides an alternative to the ways of understanding "the global." Deleuze and

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Guattari (1987) describe nomadism in their metaphor of the *rhizome*. A rhizome is different from roots and trees, according to them, because it connects any point to any other point having multiple entryways and operates by variation and expansion. Its characteristics are connection, heterogeneity, and multiplicity.

A *nomad*, like a rhizome, is not rooted in an ordered space and time, does not repose on an identity, but instead rides difference. He or she knows no boundaries and wanders across diverse spaces. This description comes in total contradiction to the unitary, binary, and totalizing models of Western thought as epitomized by the global village narrative. In the global village narrative, there is a constant pressure to eliminate the idiosyncratic or the personal and to mute questions about purpose, equity, and justice. In the nomadic narrative, however, the idiosyncratic becomes a source of empowerment in a nonhierarchical space, which is defined solely by heterogeneity, connectivity, and multiplicity.

Braidotti (1994) builds on Deleuze and Guattari's work and theorizes the nomadic both as a political project as well as a critical consciousness, an attempt to "explore and legitimate political agency, while taking as historical evidence the decline of metaphysically fixed, steady identities" (p. 5). Nomadism entails a constant state of "becoming," which Braidotti refers to as "as-if." The practice of "as-if," for Braidotti, is a "technique of strategic relocation in order to rescue what we need of the past in order to trace paths of transformation of our lives here and now" (p. 6). Braidotti also understands "as-if" as "the affirmation of fluid boundaries, a practice of the intervals, of the interfaces, and the interstices" (p. 6). For example, the hypertext/hypermedia nature of the Web allows for users to link from document to document with images, text, and sound with an unprecedented ease and form new paths as they explore connections and co-construct knowledge. While grounded in postmodernist discourse of repetition, irony, parody, multiplicity, and contingency, Braidotti is insistent that for "as-if" to be useful, it must be grounded in deliberate agency and lived experience. That is, her aim is to ensure that agency and lived experience—a grounded subjectivity—are not lost, as suggested by polemics of postmodernist ideas. On the contrary, postmodern subversions (e.g., repetition, parody, irony) "can be politically empowering on the condition of being sustained by a critical consciousness that aims at engendering transformations and changes" (p. 7). Promoting these subversions, for instance, in the context of online communication opens new possibilities for initiating transformations because these subversions constantly expose the assumptions embedded in taken-for-granted questions such as the following: "What do we want students to learn? How can we use new technologies? How should we? Why should we? What will change when we do? Do we want those changes? What do they mean for us, our students, society?

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What is fair? What kind of society do we want to live in? And, perhaps ultimately, who do we want to become?" (Bruce, 1999, p. 227).

Braidotti (1994) suggests the *polyglot—poly-glottos* in Greek, meaning "multi-lingual"—as a variation of the nomad, one who "knows that language is not only and not even the instrument of communication but a site of symbolic exchange that links us together in a tenuous and yet workable web of mediated misunderstandings..." (p. 13). The metaphor of the polyglot alludes to the significance of using multiple ways of learning and communicating. The polyglot is a nomad who learns to live with the discomfort of uncertainty and the complexity of change. For example, the multiple possibilities offered by the Internet to engage in criss-crossings of varieties of discourses that combine images, text, and sound provide the nomad/polyglot opportunities to continually re define his or her identity because he or she never acquires complete familiarity with one discourse—discourses are constantly in shift.[1] Braidotti argues that the polyglot is "the kind of subject who has relinquished all idea, desire, or nostalgia for fixity" (p. 22). This empowers the polyglot to deconstruct the stability of fixed identities and develop the capacity of thoughtful flexibility and new kinds of knowledge. Thus, the polyglot becomes a "form of political resistance to hegemonic and exclusionary views of subjectivity" (p. 23).

What do the metaphors of the nomad and the polyglot offer in reconceptualizing our relationship with information technologies? First of all, we see these metaphors as a helpful intersection of multiculturalism and postmodernism, both of which have critiqued the notion of unitary subject, albeit with different conclusions. These metaphors, unlike the global village metaphor, open possibilities for constructing and enacting new images of one's self, afforded in part by the critical application of information technologies in education. These possibilities manifest political choices and encourage the development of strategies to deal with exclusion and homogeneity by promoting nomadic thought and praxis. Some strategies that are inspired by the nomadic narrative and address problems of exclusion are the following: creating online learning communities for the needs and interests of individual learners built around their talents and the hopes for their roles in society, creating online conferences addressing the collective needs of local neighborhoods and regions, and promoting collaborations between schools and businesses (locally and globally) in ways that marginalization and oppression are exposed and confronted.

An educator or a teacher who engenders the metaphor of the nomad or the polyglot knows how to use the Internet critically, does not lay claim to any kind of natural symbolic hierarchy or identity, but rather translates through multiple discourses and identities. He or she knows that all knowledge is partial. This does not lead to anarchy or complete relativity because one can incorporate multiplicity and hybridity without losing the capacity

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for thoughtful evaluation. Burbules (1997) says that the ability in the Internet to have multiple "links" has a special role in realizing critical literacy and contains an emancipating potential because it encourages "new practices of reading [and writing]: ones that might prove more hospitable to alternative, nontraditional points of view and more inclusive of cultural difference." Yet, this is also problematic because the materials are created by unknown persons whose reasons, values, biases, motivations, and credibility are almost entirely beyond the user's awareness (Burbules, 1997). A nomad or a polyglot, however, is a critically literate learner who knows that the process of using the Internet is one of undoing the illusory stability of fixed claims and identities that mark others and one's self socially and ethnically. This articulates a different perspective on the educational potential of cyberspace within the framework of GDE. In cyberspace, explains Gur-Ze'ev (2000),

> ... virtual communities are formed "spontaneously," or arise by self-determination, and constitute free individuals participating in uncensored, chaotic, dialogical communication that crosses borders of disciplines, identities, cultures, and concepts of knowledge. It creates new worlds through and within differences, and not, as in the modern concept of knowledge and intersubjectivity, through a drive to overcome or destroy differences. Spontaneity and egalitarianism are conceived as overcoming socially constructed asymmetrical relations and distorted communication based on race, sex, ethnicity, nationality and class (p. 213).

On the other hand, we need to acknowledge that cyberspace and the nomadic narrative have their limitations. Gur-Ze'ev (2000) argues that in cyberspace, power relations are disguised, as everything becomes visible, and as such, "cyberspace contends successfully with all traditional attempts to eternalize, mystify, and de-mystify reality, and allows a new kind of normalizing education" (p. 220). We do not think that power relations are completely disguised online. For example, there are several scholars who argue and have demonstrated with research that gender and power issues are not easily disguised (Hall, 1996; Herring, 1996; Turkle & Papert, 1990). We agree with Gur-Ze'ev that the possibility "for creating uncensored, centerless, virtual communities and dialogues with others, and for freely choosing information, critical and innovative strategies, aims, and identities, look very dubious" (p. 223). We share the concerns that cyberspace reproduces social inequalities between the "haves" and the "have nots" and that its constitutive element of sameness clothed as openness to difference might be problematic.

It is, therefore, important to acknowledge that engaging in the nomadic narrative entails a contradictory mixture of emancipatory and oppressive tendencies. Understanding cyberspace as an embodiment of such contra-

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dictory tendencies and as a force of homogenization and heterogeneity is crucial to avoiding problematic assumptions about the use of information technologies in education. The often resulting inequalities and injustices create important challenges for educators who want to utilize the Internet in their teaching. Nevertheless, the metaphor of the nomad or the polyglot seems to offer a paradigm for the constant becomingness in cyberspace, a way out of normalizing conceptual and ethical systems founded upon the ideas of center, hierarchy, and linearity.

We are clearly concerned with the intersection between cyberspace identity, subjectivity, and power in promoting justice, peace, and equity. We believe that our proposition in developing a nomadic narrative to describe and analyze critical education has the potential of transcending oppressive tendencies that impose homogeneity and exclusion. In the final part of this chapter, we take on Deleuze and Guattari's call for action and examine how such action can affect exclusion in the context of GDE.

USING THE INTERNET FOR NOMADIC AND CRITICAL EDUCATION

The development of new descriptions and conceptualizations of the Internet's use in education in ways that offer political resistance and change becomes a major challenge here. Braidotti (1994) asks "How can we build a new kind of collectivity in differences?" (p. 99). The metaphor of the nomad or the polyglot offers this "collectivity in differences" because it embraces multiplicity and contingency and at the same time allows the development of political collectivities that challenge cherished beliefs and taken-for-granted assumptions. This metaphor can be used as a starting point from which to think about specific elements of the use of the Internet in education as potentially critical and emancipatory. This requires both critical/oppositional and positive/constructive components. Given this, then, the question is "How can one account for a process of 'becoming' while empowering the educator and student's political agency in the context of distance education?"

While acknowledging the limitations of the Internet and its use in education, we agree with Rice and Burbules (1992) that we can educate for critical sensitivities and critical literacy on the Internet. In other words, the process of becoming and transformation is accounted for while agency is not lost. Since information technologies are transforming education, key challenges for critical education involve how to analyze such transformations and how to devise conceptual tools and strategies to make use of information technologies that empower traditionally marginalized groups and individuals struggling for justice and equity. Critical education in using

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information technologies, has, in our view, three aspects: (1) critical emotional literacy, (2) collective witnessing, and (3) collective intelligence. These are the characteristics that are manifested in the nomad's and polyglot's modes of thinking and praxis. In other words, we see the nomad or the polyglot as the individual who *acts* using the above conceptual tools to develop critical perspectives about issues in a globalized society. We are not saying that the strategies we offer here are the the only ones. However, in the context of the nomadic narrative, we believe that they open possibilities for hope and political agency while accounting for the process of change.

Critical Emotional Literacy

Recently, there has been a growing interest in studying and documenting the affective dimensions of online relationships in educational environments (e.g., see Boler, 2001; Turkle, 1995; Vrasidas, 2002). For example, Boler (2001) inquires, "How do online social relationships and networks change traditional philosophical understandings of the relationship of self and other? What philosophies of desire and emotion are helpful in understanding digital social landscapes?" (p. 1). The importance of being emotionally and intellectually critical in using the Internet becomes more apparent if one realizes what Boler has aptly called an *economy of attention.* Economy of attention describes the extent to which digital interaction increasingly relies on the commodity and currency of attention (e.g., attention habits are dramatically changing given the nature of navigation in the Internet). How educators might ensure a quality of attention and reflection to learning in online conversations, so that one may expect a measurable "shift" in thinking and feeling, seems to be circumscribed by the economies of attention (Boler, 2001). Those of us concerned with issues of justice, peace, and equity in relation to information technologies face the challenge of discerning what counts as "critical education" given the narrowed bandwidth of communication.

The first aspect that promotes critical education is developing "critical emotional literacy" in the context of a "pedagogy of discomfort" (Boler, 1999; Zembylas & Boler, 2002). A pedagogy of discomfort requires that individuals step outside of their comfort zones and recognize what and how one has been taught to see (or not to see). Developing critical emotional literacy means analyzing and critiquing the ways in which information technologies encourage certain emotions and ideologies and prohibit others. The difficulty of developing critical emotional literacy is finding out how emotions are manipulated by information technologies. This creates two primary challenges for educators: first, one has to deal with the partisan character of the Internet and what it teaches; and second, one has to

learn how to problematize the ways in which information technologies serve as a form of cultural/emotional pedagogy and/or hegemony.

The first challenge in learning to see differently is that the Internet regularly teaches people to view the world through a "partisan" lens. Within this culture of inquiry, argues Boler (1999), a central focus is to recognize how emotions define how and what one chooses to see, and conversely, not to see. She calls this the "pedagogy of discomfort" because this process is "fraught with emotional landmines." In the aftermath of various political or social events, for example, it is difficult and painful to examine how some emotions such as anger and indignation—expressed in the media and the Internet—are potentially *mis*-educative especially when many individuals find comfort in the solidarities created. The aim of a pedagogy of discomfort applied in the context of online education is to analyze the "emotional landscapes" (Boler, 2001) created in cyberspace and how they shape and mark our sense of attachment and identity. Developing the skills and knowledge to analyze how the Internet teaches people to view the world through a "partisan" lens, is an important step in identifying exploitation, alienation, and disparities between the "haves" and the "have-nots."

The "emotional" aspect is crucial to understanding self/other relationships online because in the absence of co-presence, it is *emotional attachments* that construct our images and identities of both self and other. These emotional attachments and landscapes need to be scrutinized so that we understand how and why we "see" some things and not others. When examining the history of inequities, injustices, and wars, critical education must explore the field of emotion, not because a knowledge of emotion "installs the proper guilt" (Britzman, 1998, p. 112). Rather, its examination must be to enrich the history of emotion for someone to engage in modulations of otherness. In studying emotion as constituted through the use of information technologies, notions such as justice, peace, and equity and people's emotions about them can be thought of as matters that require more than one perspective.

A second challenge is that developing critical emotional literacy involves the knowledge and skills of how information technologies work, how they construct meanings, how they serve as a form of cultural/emotional pedagogy and/or hegemony, and how they function in everyday life. Critical emotional literacy and a pedagogy of discomfort, according to Zembylas and Boler (2002), are different from critical media literacy because the latter emphasizes the value of rational dialogue. What is missing, Zembylas and Boler say, is an explicit emphasis within critical media literacy on engaging students in the analysis of the emotional investments they experience in relationship to particular signifiers (e.g., in cyberspaces). For example, what emotions are associated with the construction of identity through textual or image representations of self and other on the Inter-

net? How can students become critically aware of such representations and deconstruct their emotional investments to particular ideas (e.g., patriotism) or images (e.g., the national flag)?

In contrast, critical emotional literacy situates itself within a nomadic narrative and emphasizes a critical inquiry that requires educators and students to learn to trace how one's subjectivities are constantly shifting. Critical emotional literacy entails creating spaces for epistemological and emotional problematizations of individual and collective emotions, histories, and sense of self and encourages an atmosphere of critical respect for difference and inquiry into the nature and effects of the culture of information technologies. The creation of such spaces contributes to a richer understanding of the ways in which globalization is manifested in education. Critical emotional literacy as a tool within a globalized world is one way of affirming the historical/political agency of the learner because it enables him or her to formulate emotion as important knowledge in relation to culture, education, and resistance.

Collective Witnessing

The second aspect that promotes critical education in using information technologies is emphasizing "collective witnessing"—that is, a collectivized engagement in learning to see, feel, and act differently. Collective witnessing is also embedded in a nomadic narrative that acknowledges the contingency of one's subjectivities. The collective emphasis is important in understanding that how we see ourselves and want to see ourselves are inextricably intertwined. Collective witnessing calls not only for critical emotional literacy but also for action that is a result of learning to become a "witness" and not simply a "spectator" (Zembylas & Boler, 2002). Witnessing is different from spectating in that witnessing assumes a collectivized engagement in learning to see differently (Boler, 1999). Witnessing is a call to action—action hopefully as a result of learning to see differently. This does not assure any change; however, it represents the first step toward that direction. Therefore, it matters a great deal how educators invite students to engage in collective witnessing, especially as educators and students experience each other through new information technologies in virtually disembodied ways. Collective witnessing is also different from critical inquiry in that the latter often promotes educational individualism while the former emphasizes the collective and the political/ethical aspects of collectivity.

An example of witnessing is reflected in the case of a classroom in which students' reactions to an issue (e.g., "deleting the debts owed by poor countries") do not fall into easy identification. As witnesses, the students

undertake their historical responsibilities and investigate, for instance, "alternative media sources" in the Internet. They ask questions such as the following: What are the motives of doing this? What are the costs and benefits? How do people feel about this issue: (a) if they are coming from rich countries; (b) if they are coming from poor countries? As students become willing to learn to see differently and understand how their lives are intertwined with others, they can begin to determine "for themselves what kinds of actions make sense for them to take given their own ethical vision" (Boler, 1999, p. 198). Some might choose to express alternative perspectives in the classroom or in the public arena. Others might choose to participate in groups that reformulate education.

The implication of promoting collective witnessing in the context of online education is that those who engage in online projects (e.g., conferences that involve hundreds of educators online together) need to clarify for themselves and for the students their ethical responsibilities. The way in which educators and students express their thoughts and emotions online and the way in which they listen to each other need to encourage a "politics of listening" (Levinas, 1987). According to Levinas, just listening is simply and profoundly listening to each and every other. Online educators have the potential to develop a just listening when they promote it from the grassroots in every way possible through the use of the Internet. Thus, we want to build on Levinas' view that in the "face-to-face" of our encounters with others, the ethical is born and reborn—not in terms of sameness but in the sense of absolute otherness—and argue that if a politics of listening is promoted in online communication, the other is not merely an abstract citizen of a political community, but a member who listens "actively" (Garrison, 1996). To listen actively, says Garrison, one must be "vulnerable" to the other. That means suspending those beliefs that constitute our personal identity. The rewards of "listening online" are that others different from ourselves can teach us to see and tell the story of our lives in new ways, and thereby, grow, as Garrison says. Others—individuals I have never met—call me into question, "empties me of myself and empties me without end, showing me ever new resources. I did not know I was so rich" (Levinas, 1987, p. 94).

Furthermore, Fabos and Young (1999) suggest, in a mixture of Foucaultian and Neo-Marxist fashion, that the need is to historicize and contextualize the use of information technology (e.g., through distance education) "in the framework of power and dominance, and ... students are asked to tackle provocative questions [that] cultivate more critical or political sensibilities" (p. 242). Consequently, they propose something similar to collective witnessing and argue that

> ... [W]e need to locate and highlight those projects which encourage young students to go beyond "seeing the world" as electronic tourists from the safety of their computer screen and a dominant American perspective. We need to celebrate those projects that ask troubling questions about local inequities, and even the economic role and impact of telecommunications on indigenous communities. We need to help students ask questions that consider why the sixth grade girl from the Midwest might never end up net-chatting with the same-age girl in Indonesia who may have sewed her over-priced Adidas t-shirt or Nike shoes.
>
> In this case, we can't expect young students to "guide their own learning"; instead, we must help them understand—and understand ourselves—the complex role technology plays in our lives. ...
>
> While distant learning activities may appear to be magical education experiences, all educators must first step back, critically evaluate the inevitably enthusiastic rhetoric, and attempt to understand the complex contextual framework behind the push for telecommunication exchange (p. 249–250).

The ethical responsibility of the educators is to become what Aronowitz and Giroux (1985) called "transformative intellectuals." Educators can use their knowledge and expertise in promoting the development of collective witnessing as a useful tool for teaching their students and themselves how subjectivities change in unpredictable ways; learning how to be a witness instead of a spectator becomes possible if one acknowledges the interconnections with others (Boler, 1999).

Collective Intelligence

The significance of collectivity in information technologies and education is particularly expressed in Levy's (1997) notion of "collective intelligence." He argues that collective intelligence is the inevitable result of intelligent systems, which are structurally coupled through electronic mediation. In other words, connecting intelligences breeds collective intelligence and begins to monitor and correct its own behavior in a way analogous to the human nervous system. Thus, for Levy, information technologies are creating a nomadic culture in which our intellectual capabilities are constantly evolving. Denzin (1995) argued that "existence is not determined solely by interaction or by social acts. ... Information technologies (the mass media) mediate and define social life" (p. 251). Similarly, says Levy, collective intelligence is not a cognitive object, and intelligence needs to be understood "in its etymological sense of joining together (*inter legere*), as uniting not only ideas but people, 'constructing society'" (p. 10).

Information technologies have the potential to "promote the construction of intelligent communities in which our social and cognitive potential can be mutually developed and enhanced" and "enable us to think collectively rather than simply haul masses of information around with us" (p. 17). The Cartesian "I know, therefore I am" becomes "We know, therefore we are." According to Levy (1997), "the basis and goal of collective intelligence is the mutual recognition and enrichment of individuals rather than the cult of fetishized or hypostatized communities" (p. 13). Levy's "collective intelligence" is a "universally distributed intelligence" in which "no one knows everything, everyone knows something, all knowledge resides in humanity" (p. 20). Collective intelligence is a continuum, and it is developed through collective discussion, negotiation, and imagination.

Levy's (1997) description of collective intelligence has a lot to offer educators and students, especially in the articulation of the nomad/polyglot learners, the "immigrants of subjectivity," to use Levy's term (p. 202). The metaphor of the nomad or the polyglot reflects the continuous transformation of all kinds of landscapes: economic, aesthetic, political, professional, educational, emotional, and mental. This nomadism will develop "in an invisible space of understanding, knowledge, and intellectual power, within which new qualities of being and new ways of fashioning a society will flourish and mutate" (p. xxv). Educators have the opportunity to systematically produce the tools that will enable learners to construct intelligent communities, and think as a group capable of dealing with the continuous transformations.

Pór (1995), exploring the potential of collective intelligence, pointed out that social progress is lagging badly behind technological progress. Now, however, humanity has the opportunity "to optimize the design of social institutions for closing the gap between the human conditions and human potential." The potential of collective intelligence can be described in terms of the development of new or enhanced individual and collective competence, research contributions to the evolution of knowledge used to promote issues of peace and social justice, and the creation of new designs for global virtual education. Some important questions in expanding collective intelligence are as follows: What roles, responsibilities, and agreements are necessary to foster the emergence of collective intelligence? What technologies have to be used in support of new designs for global virtual education, especially in providing help to poor and developing countries?

Rossman (2002) argues that

> ... through networking we can draw upon expertise, enable creative thinking and develop collective intelligence. *However we are just beginning to learn how,* in part because although researchers engage in a great deal of networking conversations, too few have given serious attention to online thinking skills.

> Making networking work thus for research planning *is a new art, yet to be learned* ... Networking can amplify collective intelligence to bring many minds together for deeper, creative, imaginative collective thinking ... Suppose that each of a thousand universities conducted an ongoing seminar on one of a humanity's crucial issues and continued it year after year, connecting a worldwide community of experts online. What existing think tank could rival such a process for experimenting with the possibility of larger and more sustained thinking?

Collective intelligence provides the potential of linking people to report significant experiences or demonstrations of success in meeting a need or solving a problem and linking widely scattered experts, combining their expertise to amplify many kinds of research.

We believe that the notions of "collective intelligence" and "collective witnessing" are connected in an important manner; their emphasis on the "collective" is an expression of political will to the extent that they deepen our sense of ethics regarding the facilitation of navigation and action in cyberspace. As Levy (1997) writes, "Cyberspace could become the most perfectly integrated medium within community for problem analysis, group discussion, the development of an awareness of complex processes, collective decision-making, and evaluation" (p. 59). The political and ethical implications of developing collective witnessing and collective intelligence via information technologies are manifest in the emphasis on creating collectivities that are sensitive to each other's needs and concerns.

> The intelligent collective doesn't analyze itself to understand itself: It understands itself because it lives and only understands itself by living. Within the knowledge space knowledge no longer objectivizes but subjectivizes, on the basis of a subjectivity that is plural, open, and nomadic. In the knowledge space the preferred object of knowledge reflects the eternal becoming-beginning of the earth, the perpetual resumption of becoming of the collective intellect and its world (Levy, 1997, p. 207).

In the context of using information technologies, educators and students, as collective intellects, have the possibilities of empowering themselves to be critical and to take action for justice, peace, and equity. We do not have answers regarding how to provide technology access to those who do not have it; however, those who do have it can take the historical/political responsibility to become witnesses against injustices, wars, and inequities around the world. Developing critical education means exploring new ways of incorporating critical emotional literacy, collective witnessing, and collective intelligence into online activities.

CONCLUSION

Globalization and information technologies create tremendous challenges as well as opportunities for educators. Critical education within this context can inflect the discourse to point precisely to issues that elucidate both conflicts and new opportunities. The critical use of information technologies in education opens opportunities for research, development, and interaction not previously open to educators and students who did not have access to information and education. The Internet opens access to information for more people, but it has its problems and limitations. A critical education would demand access to new technologies for all, but this access should be accompanied with skills for critical evaluation of new technologies. Developing a critical technology education will become increasingly important. For us, it is the necessity of learning to deal with difference and otherness and to forge meaningful collectivities that give the political aspects of this project the capacity to educate students in a globalized world.

We have explained the importance of thinking through information technologies in education within a global context as part of an examination of issues related to individual agency and ethics of care for the other. We have called this a nomadic narrative and suggested that the metaphor of the nomad or the polyglot can be a useful tool for analyzing globalization and its impact on education, in that it attempts to articulate an alternative to the pretense to neutrality, universality, and metaphoric images of the global village. Critical emotional literacy, collective witnessing, and collective intelligence are conceptual tools that can be developed to promote critical education in using information technologies in distance education.

Critical education in the 21st century should attend to the new cultural forms associated with globalization and prepare individuals to "read" narratives and images as part of media/emotional/technological literacy. Such an effort has the potential of empowering individuals and groups to analyze and critique the emerging effects of globalization on distance education. The challenge for education today is to promote multiple Literacies and to use the new technologies in creating a culture and society based on respect for cultural difference and aiming at fuller participation of individuals and groups largely excluded from wealth and power in society. How new technologies will be used depends on the overall education of individuals; thus, the rest of education cannot be disassociated from globalization and new technologies. Educators need to constantly devise new strategies in which technologies and distance education can be used for the advancement of what is ultimately an important educational vision: to create a more just and peaceful world.

NOTE

1. In the writings of Foucault (1970/1977), discourses take the meaning of discursive practices that are always integral to institutions and their practices and as a result designate "exclusions and choices." In other words, discourses are not simply about language because they are manifested in individuals' practices, bodies, and performances.

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Linda Harasim is a Professor in the School of Communications at Simon Fraser University. Dr. Harasim was the founder of the TeleLearning Network of Centers of Excellence, which during her period of leadership (1995 to 2001) received over $50 million (Can.) in research funding that supported over 100 researchers from 25 universities across Canada and engaged 225 private and public sector organizations in the studying of elearning in the schools, in colleges and university applications, and in the workplace and professional communities of practice. Recognized internationally as a pioneer in designing, testing, delivering, and demonstrating the effectiveness of online education, she leads the Virtual-U research projects, involving the largest field trials of post-secondary education in the world, and together with Marc Belanger of the International Labor Organization, she developed and released *Course Reader*, the first educational open source Learning Management System. Since the early 1980s, Dr. Harasim has researched networks and has designed, implemented, and evaluated networking applications in the United States, Latin America, and Canada,

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